HEMODIALYSIS: PSYCHOSOCIAL ADJUSTMENT ATTITUDES AND BEHAVIORS ASSOCIATED WITH COMPLIANCE TO THE DIETARY REGIMEN

By

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Empirical research in the area of psychosocial adjustment factors associated with levels of compliance to hemodialysis dietary regimens is practically nonexistent. In an effort to help understand this association, this study was conducted to investigate the relationship between chronic hemodialysis patients' (a) levels of compliance to dietary fluid restrictions and their attitudes and behaviors associated with psychosocial adjustment to hemodialysis; (b) levels of compliance to dietary fluid restrictions and their demographic variables of age, sex, race, years of education, and marital status; (c) length of time on dialysis and their levels of compliance to dietary fluid restrictions; (d) psychosocial adjustment attitudes and behaviors and their length of time on dialysis; and (e) psychosocial adjustment attitudes and behaviors and their demographic variables of age, sex, race, years of education, and marital status.

Fifty-four adult chronic hemodialysis patients were assessed by 13 direct care hemodialysis nurses using the PADC over a two-week period. The patients' demographic data, length of time on dialysis, and between dialysis weight gain (indices of levels of compliance to dietary fluid restrictions) for the previous 12 weeks were gathered and compared based upon to their assessed attitudes and behaviors on the PADC.

Multiple regression analyses, Pearson Product-Moment correlations, and multivariate analysis of covariance were employed to analyze the data. The main finding in the present study indicates that chronic hemodialysis patients' levels of compliance to dietary fluid restrictions were significantly related to some of their displayed psychosocial adjustment attitudes and behaviors assessed by the PADC. Specifically, the results of this study indicated that chronic hemodialysis patients' levels of compliance to dietary fluid restrictions were significantly related to their displayed compliance with dietary restrictions and ages. Chronic hemodialysis patients' length of time on dialysis in this study was found not to be significantly related to their levels of compliance to dietary fluid restrictions or displayed psychosocial adjustment attitudes and behaviors. The results in this study did, however, indicate that a significant relationship existed between chronic hemodialysis patients' demographic variables of ages and years of education and some of their displayed psychosocial adjustment attitudes and behaviors as assessed by the PADC.

CHAPTER ONE

INTRODUCTION

Statement of the Problem

Over the past decade and a half patient compliance has stimulated a tremendous amount of attention and concern among health care providers and researchers. These individuals come from a wide range of disciplines, but particularly from psychology and medicine (Blackwell, 1973; Dunbar & Stunkard, 1979; Haynes, Taylor, & Sackett, 1979a; Masur, 1981; Sackett & Haynes, 1976). Patient noncompliance to dietary and medical treatment regimens is widely recognized as a major problem in the health care field. Numerous investigations by psychologists and medical practitioners studying different patient samples, and utilizing a variety of methods and criteria to define noncompliance, have revealed that noncompliance is a concomitant feature of all dietary and medical regimens that involve self-administration and/or restrictions.

Reviews of these large number of studies of compliance have reported noncompliance rates ranging from 18% to 89%. The rate of noncompliance and the psychological and medical practitioners' limited success in improving or enhancing it have led to a great deal of frustration in the psychological and medical arenas. Fortunately, however, for practitioners as well as patients this frustration has motivated an abundance of research efforts to

identify factors associated with compliance behaviors among patients. The objective of many of these efforts has been to develop potential assessment and counseling strategies for improving compliance and thus, provide better quality of patient care.

The overall effectiveness of a medical regimen depends upon at least two components: the efficacy of the prescribed and/or proscribed treatment for the disease and the extent to which a patient's behavior (in terms of taking medications, following diets, or executing life style changes) coincides with the treatment prescription and/or proscription. For some regimens, such as those for chronic illnesses, patient compliance is essential for successful treatment.

Assuming that a prescribed and/or proscribed treatment regimen is efficacious for a disease, noncompliance to the treatment regimen can make the regimen less effective or even ineffective. The consequences of noncompliance are quite serious, including (a) more frequent medical emergencies and unnecessary prescriptions of more potent and/or toxic drugs (Norell, 1979), (b) nonimprovement or excerbation of disability and progression of the disease (Stewart & Cluff, 1972) and, (c) failure of treatment over time resulting in death in many cases (Dixon, Stradling, & Wooton, 1957; Hogarty, Goldberg, & The Collaborative Study Group, 1973; Sackett, Haynes, Gibson, Hackett, & Taylor, 1975).

Medical regimens may be viewed as involving two medical technologies, applied medicine (including physiology and

pharmacology) and behavioral medicine. The technology of applied medicine has grown progressively more sophisticated and widely available; however, the anticipated benefits of these advances have not been actualized. It has become unequivocally clear that an important factor in this therapeutic shortfall is that of patient noncompliance with the prescribed and/or proscribed treatment. Medications and dietary recommendations are only effective when consumed and followed respectively and are most effective when consumed and followed as prescribed or proscribed.

Patient compliance and/or noncompliance, however, is a behavioral phenonmenon. Unfortunately, advancements in the technology of behavioral medicine with regard to identifying factors associated with compliance and developing intervention strategies to increase or enhance compliance have been minimal. There is, however, a growing awareness developing within the fields of health psychology and behavioral medicine compliance research of the complexity of this process and the necessity for practitioners, whether they are counseling or clinical psychologists, physicians, physician assistants, nurses, or social workers, to consider factors often ignored within traditional medical model perspectives.

Need for the Study

Noncompliance to the hemodialysis treatment regimen for chronic renal disease is a major and common problem and often

results in death. This problem is the subject of this research. The hemodialysis treatment regimen is of particular significance in compliance research both because of the nature of the regimen and because of the severe consequences accruing from noncompliance by the patient. The hemodialysis patient must face what is one of the most disruptive, demanding, and subjectively unpleasant treatment regimens of all the therapeutic modalities thus far developed by medical technology for chronic diseases.

Approximately 70,000 people in the United States receive treatment for renal failure at a cost of about two billion dollars per year (Schwartz, 1984). The most widely utilized treatment regimen for the majority of these patients is chronic intermittent (usually three times a week) hemodialysis. Hemodialysis employs the process of diffusion of a patient's blood supply through an artificial kidney machine across a semipermeable membrane to remove toxic waste products and excess fluids normally eliminated by urination while simultaneously adding desirable components. This process allows patients with chronic renal failure to maintain a relatively healthy state. However, these treatments are not sufficient alone to relieve all of the symptoms of chronic renal failure. In addition, patients are prescribed a complex regimen of medication and dietary restrictions.

The medication regimen each day includes a prescribed phosphate-binder to reduce bone degeneration and vitamin supplementation consisting of a multiple vitamin, folic acid, and iron supplement. In addition, many patients are prescribed

anticoaggulants to prevent blood clotting and antihypertensives to control blood pressure. The prototypical hemodialysis dietary regimen restricts the intake of sodium (i.e., salt), potassium (i.e., fruits and vegetables), protein, calories, and fluids.

Noncompliance to dietary and medication regimens leads to dangerous concentrations of waste products and fluids in the blood stream. These concentrations can result in a wide array of medical complications such as congestive heart failure and/or pulmonary edema, anemia (pallor), fatigue, excessive itching, intestinal bleeding, nausea and vomiting, muscle and bone weakness, loss of memory, convulsions, and ultimately death. Despite the ominious consequences of noncompliance, it is estimated that about one third of all hemodialysis patients fail to comply with dietary restrictions and about half do not comply with medication restrictions (Cummings, Becker, Kircht, & Levin, 1982).

A limited number of the studies reported in the literature to date have attempted to identify factors associated with compliance behaviors among chronic hemodialysis patients (Cummings et al. 1982). Furthermore, the factors that have been examined in the research have been those such as personal and environmental factors that are relatively enduring and immutable. Thus, research in this area has not led to a clear understanding of what practitioners can and should do to increase or enhance compliance behavior to the complex dietary and medication components of the hemodialysis regimen.

Compliance behavior in this patient population may be best conceptualized as an aspect of adjustment to the hemodialysis regimen (Czackes & DeNour, 1978). Tucker, Chennault, Ziller, Huber, Blake, and Finlayson (1986) provide further support for this conceptualization. In a study involving 264 dialysis nurses to determine specific attitudes and behaviors associated with psychosocial adjustment to hemodialysis, Tucker et al. (in press) found 8 global factors and 43 specific psychosocial adjustment attitudes and behaviors associated with hemodialysis that could be compiled into a checklist (see Appendix A). The 8 global factors were emotional control, active involvement in treatment, compliance to medical regimens, positive interpersonal behavior, independence, compliance with dietary restrictions, understanding of medical regimen, and acceptance of treatment restrictions.

Furthermore, after performing a factor analysis on the checklist data, Tucker et al. (1986) found that patient psychosocial adjustment to hemodialysis is most dependent upon the patient's compliance to the medical regimen, emotional stability, active involvement in treatment, mature interpersonal behavior, and self-esteem. However, these researchers did not identify which specific adjustment attitudes and behaviors are associated with compliance to the dietary and medical regimen. Even though comparative compliance to the hemodialysis dietary and medication regimen is relatively easy to measure, there are few other reports in the literature that identify specific hemodialysis psychosocial

adjustment factors that could and should be assessed in order to monitor and develop intervention strategies to increase or enhance compliance behaviors (Cummings et al., 1982; Czackes & DeNour, 1978).

In summary, there are a number of important reasons for conducting a study that will explore the relationship between specific hemodialysis psychosocial adjustment attitudes and behaviors and levels of compliance to the hemodialysis dietary regimen. These reasons include the documented magnitude of noncompliance to the hemodialysis dietary regimen, the ominous consequences of noncompliance both physical and psychological for chronic hemodialysis patients, and the lack of empirical research with regard to specific hemodialysis psychosocial adjustment attitudes and behaviors related to compliance with the hemodialysis dietary regimen.

Purpose of the Study

The main purpose of this study was to investigate the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their hemodialysis psychosocial adjustment attitudes and behaviors. Specifically, this study investigated (a) the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their attitudes and behaviors associated with psychosocial adjustment to hemodialysis; (b) the relationship

between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their ages, sex, race/ethnicity, years of education, and marital status; (c) the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their length of time on dialysis; (d) the relationship between chronic hemodialysis patients' psychosocial adjustment attitudes and behaviors and their length of time on dialysis; and (e) the relationship between chronic hemodialysis patients' psychosocial adjustment attitudes and behaviors and their ages, sex, race/ethnicity, years of education, and marital status.

Significance of the Study

The data collected from this study may be used as baseline criteria for examining specific hemodialysis psychosocial adjustment attitudes and behaviors that are associated with compliance to the hemodialysis dietary regimen. These baseline data are potentially useful to practitioners such as counseling and clinical psychologists, dialysis staff nurses, physicians, physician assistants, and social workers. These baseline data can aid these practitioners in identifying and monitoring specific hemodialysis adjustment attitudes and behaviors which may increase or enhance individual patient compliance behavior. Assessments of a particular patient can suggest counseling treatment goals and

organize discussions of what the patient is or is not doing toward specific treatment goals for increasing or enhancing compliance behavior (which all practitioners can work conjointly to achieve). A group treatment team approach allows all involved practitioners to orient patient care to meeting the individual needs of the patient as well as formalizing and improving "health counseling" to increase or enhance compliance behavior.

Educational training programs such as those training counseling and clinical psychologists, physicians, physician assistants, nurses, and social workers could include data from this study into behavioral medicine and health psychology courses. In addition, facilitators of inservice training programs particularly counseling psychologists, nurses, and social workers could use data from this study to develop workshops on compliance to hemodialysis for continuing education. Finally, clinical practitioners and researchers from both psychology and medicine could use data collected from this study. They could conduct further research on hemodialysis attitudes and behaviors associated with compliance and evaluate the effectiveness of counseling intervention programs designed to increase or enhance compliance to the hemodialysis treatment regimen.

Definition of Terms

The definitions of relevant terms used in this study are as follows:

Age. The duration of patients' existence measured in years.

Antihypertensives. Any agent which reduces high blood pressure.

Applied medicine. The art of preventing, caring for, and assisting in the cure of disease and care of the injured by using the sciences of physiology and pharmacology.

Behavioral medicine. The field concerned with the development of behavioral-science knowledge and techniques relevant to the understanding of physical health and illness and the application of this knowledge and these techniques to prevention, diagnosis, treatment, and rehabilitation. Psychosis, neurosis, and substance abuse are included only insofar as they contribute to physical disorders as an end point (Schwartz & Weiss, 1977).

Chronic renal failure. The state of renal function characterized by sustained and irreversible kidney damage in which normal kidney function is inadequate to maintain a normal internal milieu in both volume and composition.

Compliance. The extent to which a patient's behavior (in terms of taking medications, following diets, or executing life style changes) coincides with treatment prescription and/or proscription.

Congestive heart failure. A condition characterized by weakness, breathlessness, abdominal discomfort, and edema in lower portions of the body resulting from venous stasis and reduced outflow of blood.

Education. The total number of completed years of school.

Folic acid. A member of the vitamin B complex necessary for blood formation and the metabolism of nucleoproteins.

Health psychology. The aggregate of the specific education, scientific, and professional contributions of the discipline of psychology to the promotion and maintenance of health; the prevention and treatment of illness; the identification of etiologic and diagnostic correlates of health, illness, and related dysfunction; and the analysis and improvement of the health care system, and health policy formation (Matarazzo, 1982).

Hemodialysis. The process of diffusion of a patient's blood supply through an artificial kidney machine across a semipermeable membrane to remove toxic metabolic end products and excess fluids normally eliminated by urination while simultaneously adding desirable components.

Hemodialysis treatment regimen. A therapeutic modality that consists of the hemodialysis process, dietary, and medication regimens.

Interdialysis weight gain. An indirect measure of dietary fluid compliance levels. Interdialysis weight gains are calculated by subtracting from each patient's predialysis weight the previous treatment's postdialysis weight.

Length of time on hemodialysis. Total number of months on maintenance hemodialysis.

Marital status. Patients' levels were married with partner (MP), single with partner (SP), or no partner (NP).

Prescribe. To order or advise as a medicine or treatment; said of physicians.

Proscribe. To forbid the practice or use of.

Psychosocial adjustment attitudes and behaviors. The 43 items and 8 factors included in the Patient Adjustment to Dialysis Checklist (see Appendix A).

Pulmonary edema. Effusion of serous fluid into air vesicles and into interstitial tissue of lungs.

Race/Ethnicity. Defined as black, white, Hispanic, or specified other.

Semipermeable membrane. A thin, soft, pliable layer of tissue which will allow fluids, but not the dissolved substance to pass through it.

Sex. Male or female gender.

Toxic metabolic end products. Poison waste chemicals and/or substance.

Organization of the Study

The review of the literature included in Chapter Two provides a succinct overview of the major approaches to the explanation, prediction, and control of compliance. With these underlying principles thus elucidated, the literature regarding the hemodialysis population, specifically emphasizing the investigation of patient compliance to the hemodialysis regimen, is reviewed. The methodology is presented in Chapter Three and includes the null

hypotheses, population and sample, instrument, procedures, and the analysis of data. The results of the study, a discussion of the results, and the limitations of the study are presented in Chapter Four. The conclusions, implications, summary, and the recommendations for further study are included in Chapter Five.

CHAPTER TWO

REVIEW OF THE LITERATURE

A concise overview is presented in this chapter regarding frequently occurring issues in the general compliance literature, such as the methodological issues in the study of compliance, magnitude of noncompliance, noncompliance, factors determining compliance, and interventions to improve patient compliance. With these underlying issues presented, the investigation specifically examines the literature regarding the hemodialysis population and dietary treatment compliance.

Methodological Issues in the Study of Compliance

Any critical review of the compliance literature is complicated by the widely varying approaches that investigators have used regarding the three basic dilemmas of how to define, assess, and measure compliance behavior. First, in any detailed analysis of the compliance literature it is important that the definition of the term "compliance" be considered. The operational definitions of compliance have varied considerably across studies, with definitions ranging from strict to loose interpretations. Some researchers have employed a number of other terms in lieu of

compliance such as, adherance, obedience, cooperation, collaboration, and therapeutic alliance. These definitional differences have usually reflected the varied prescriptive and proscriptive behaviors under investigation (e.g., taking medication, diet restrictions, exercising).

Haynes et al. (1979) have considered the semantic difficulties inherent in the varied definitions of compliance and concluded that due to the prevalent use in the literature and the lack of acceptable alternatives the term compliance amply describes the "extent to which a person's behavior (in terms of taking medications, following diets, or executing life style changes) coincides with medical or health advice" (pp. 2-3). It is in this sense that the term compliance will be utilized within this dissertation research and literature review, while at the same time maintaining the perspective that compliance behaviors are highly complex interactions between clinician, patient, treatment regimen, and various psychosocial adjustment factors.

Second, an additional problem in defining compliance is the way some investigators choose to report assessment rates of compliance. Some investigators choose to report actual compliance rates or the amount of treatment units taken divided by the amount of units prescribed whereas others report as their compliance rate the percentage of patients' assessed compliance according to some predetermined standard. In the latter instance, investigators

have generally used a categorical approach to patients. They have classified various levels of compliance by virtue of cut-off scores that at times have made a simple dichotomous classification of compliance versus noncompliance, a justifiable approach, particularly if one is mainly concerned with the identification of high risk noncompliant patients (Gordis, 1976).

Other investigators have attempted a more complex system of defining compliance, viewing it as inadequately served by a dichotomy. A number of these studies have in fact treated compliance as a continuous variable, dealing with individual patients in terms of a percentage of potential compliance (e.g., patient number one who displays a specific item was compliant 50% of the time). Gordis (1976) has pointed out that this approach is directly applicable in the research realm of compliance, in that it delineates relationships between differing levels of compliance and other patient characteristics and allows for a more powerful parametric analysis. This is the approach that will be utilized in this dissertation research.

The determination of whether or not (or to what degree) any individual patient has complied or not complied with the prescribed treatment is often difficult. Monitoring patients' compliance with prescribed regimens is important for several reasons. The patient may be dangerously following an incorrect schedule of administration such as omission of doses, taking medication for the

wrong reason, and/or erring in dosage or timing of the medication sequence. By monitoring patients' compliance, health care providers can modify treatment regimens in view of patients' difficulty in following them or as a result of the effect of the regimens on patients' medical conditions. Specific methods available for measuring compliance can either be direct or indirect; the actual choice of measurement may also be determined by the particular patient population.

Indirect methods of compliance measurement include patient self-report, therapeutic outcome, physician estimate, pill and bottle counts, and mechanical methods. Patient self-report is a common method of compliance measurement that involves asking the patients and/or family members, if they have taken the amount of medication as prescribed. However, it has become increasingly clear that patients are extremely unreliable informants regarding their level of treatment compliance. A number of investigators have reported that patients significantly under report noncompliance (Gordis, Markowitz, & Lilienfeld, 1969; Haynes, Taylor, & Sackett, 1979b; Park & Lipman, 1964). However, in several studies when patients admitted to being noncompliant they were indeed found by urine essay to have been noncompliant with the medical regimen (Gordis et al., 1969; Lund, Jorgensen, & Kuhl, 1964; Sackett, 1979).

In addition, Haynes et al. (1979) pointed out that when comparing patient self-report to pill counts although only 50% of patients admit to being noncompliant, virtually all patients who admit to noncompliance are in fact noncompliers. They surmised that although one can rarely believe a patient who reports to be compliant, one can nearly always believe a patient who reports to be noncompliant.

There is also some indication that patients who report to be noncompliant are the most likely to respond to an intervention aimed at increasing compliance (Sackett, 1979). Thus, if the goal of measurement is to identify a subgroup of a patient sample that is likely to be most amenable to compliance intervention strategies, then the self-report method may be adequate. Where the risk of ominous consequences of noncompliance to those who misrepresent themselves as compliers is great, such as with chronic hemodialysis patients, more accurate techniques are essential.

Therapeutic outcome as a measure of compliance is another indirect method. However, this indirect method of compliance may not be a valid or reliable index of patient compliance due to extraneous variables such as multiple treatments, psychosocial factors, diagnostic inaccuracy, and the remission of an acute illness that would have abated despite any therapeutic intervention (Masur, 1981). An example of how misleading this indirect measure of compliance may be is provided by Sackett (1979) who showed that

after six months, 35% of a sample of previously uncontrolled hypertensives were in control and that the rate of compliance was twice that of noncompliance (23% vs. 12%) for the controlled versus uncontrolled patients. Thus, 12% were in control without being compliant, while another 34% were compliant but uncontrolled.

Physician estimates of patient compliance based on their own judgment have been overwhelmingly demonstrated in the literature as having questionable validity for measuring compliance. A number of investigators have found that medical residents or physicians estimate compliance levels in their patients with accuracy no better than chance (Caron & Roth, 1971; Charney et al., 1967; Davis, 1968; Mushlin & Appel, 1977). Despite the inaccuracy of this method it remains as one of the most common methods for assessing compliance.

Pill and bottle counts offer a more potentially accurate indirect method of measuring compliance. This method involves periodic counting of pills or bottles to see if the amount of remaining medication compares with the amount that would have remained had the patient consumed the medication with complete accuracy. Unfortunately, in addition to being ineffective for monitoring patterns of noncompliance that may be clinically significant (Gordis, 1979), this method is subject to falsification by the patient, who may simply discard any unconsumed medication. Thus, as one would expect this indirect method of measuring

compliance generally results in reports of unusually high rates of compliance (Mattar, Morkello, & Yaffe, 1975; Tinkelman, Vanderpool, Carroll, Page, & Spangler, 1980).

Finally, mechanical methods utilizing sophisticated medication monitors that record the number and time sequence of pills removed from prescription bottles have been developed (Moulding, Onstad, & Sharboro, 1970; Norell, 1979). However, as with pill counts, the medication monitor cannot guarantee that patients did not remove and discard the medication without using it appropriately. Therefore, this indirect method of measuring compliance may offer relatively little advantage over pill or bottle counts.

Direct methods of evaluating compliance may include tracer and marker substances, blood/serum assays, and urine assays or inspection. These methods are often considered the most objective and accurate measures available (Masur, 1981). Tracer and marker substances involve the addition of a tracer "tag" to a patient's medication. Tracers may be used in two ways: a tag can be added to all of the patient's medication, and compliance is determined by noting the proportion of tests that contain the tracer, or tracers may be packaged in a known random order within the medication supply. The latter is known as the marker method of measuring medication compliance and may allow for a more definitive assessment of patient compliance behaviors.

Blood/serum assay is an analysis of a blood sample to assess whether patients have ingested medications, food, or water. The timing of drawing blood from the patient is critical for assessing compliance, since ingested substances may show wide variations in their rate of absorption and metabolism. Urine assay is a procedure used to test for excreted medication or drug metabolic. As with blood/serum assay, of critical importance to the accuracy of the test is the timing of the sample. The timing is critical due to the different excretion patterns of medications and metabolics.

Although direct analysis appears to be the most objective measure of compliance, it is still difficult to accurately compare rates of compliance between studies (Masur, 1981). In large part, this difficulty is due to the methodological issues in the study of compliance mentioned earlier, particularly the varying definitions of compliance that have been proposed. In addition to the above direct methods, a less accurate method is measurement of body weight in the form of weight gain or loss as an indicator of fluid consumption and/or caloric intake or expenditure (Haynes et al., 1979). This method is typically used to assess fluid intake compliance among hemodialysis patients.

In addition to the aforementioned methodological problems often concomitant with the definition, assessment, and measurement of treatment compliance, a major potential confounding variable that has been prevalent in the research literature has been in the

sample selection procedures. A significant number of studies have utilized cross-sectional samples, where all patients in a given treatment center would be studied with associations then drawn between various variables such as sex, race, or length of time in treatment and their measured degree of compliance.

Epstein and Cluss (1982) have criticized this sampling procedure pointing out that most studies include in their sample only patients willing to participate in a research project. They suggest that it is reasonable to assume that this subgroup of volunteers may be different in motivation or other characteristics, making them more likely to comply as a group than those who are not willing to participate. They further pointed out that even investigators who have used as their sample all patients being seen in a clinic or practice at a given time for a specific disease or disorder have, by this cross-sectional method, eliminated those grossly noncompliant patients who began treatment at an earlier time, discontinued treatment, and never returned.

Thus, due to the aforementioned reasons, cross-sectional sampling procedures result in rather inflated compliance rates or at least underestimates of the compliance rates in a large number of investigations. Sackett and Snow (1979) have supported the use of "inception cohort," or all members of a group of patients entering a treatment program, and including compliance of both dropouts and "survivors" in determining final compliance rates.

However, they note that the "inception cohort" approach is more demanding on time and resources. A more time-efficient alternative to avoid this type of confounding of data to determine compliance rates would be to collect information about patients and their compliance without their direct participation in the research (Somer, 1984). This is the approach that was utilized in this dissertation research.

Magnitude of Noncompliance

The extent of patient noncompliance to medical regimens is well documented in the literature, though it is still the least understood of health related behaviors (Becker & Maiman, 1975). Researchers, utilizing a variety of different subject populations, methods, and definitions of compliance, have reported rates of compliance ranging from 18% to 89% (Epstein & Cluss, 1982). These studies may be summarized to the extent that there is consistency in the compliance rates as follows: First, patients comply with about 75% of the appointments that they make, but with only approximately 50% of those made for them (Haynes et al., 1977); second, the average level of compliance for short-term regimens is 62% and declines rapidly with the treatment length of time (Haynes et al., 1977; Sackett & Snow, 1979); and finally, about 57% of patients comply with long-term regimens (Sackett & Snow, 1979).

Factors Determining Compliance

A vast body of literature has proliferated during the last decade to delineate the possible reasons for the apparent widespread lack of patient compliance with therapeutic and prophylactic regimens. Many of these studies have focused on the following factors: sociodemographic, disease, therapeutic regimen, and psychosocial factors.

Sociodemographic Factors

An exhaustive critical review of the literature concerning sociodemographic factors or determinants was conducted by Haynes et al. (1979). The results are revealing in terms of the lack of association that can be demonstrated between compliance and age, sex, education, socioeconomic status, occupational status, income, marital status, race/ethnic background, and religion. Masur (1981), however, suggested that when these sociodemographic factors are combined with other parameters, they may prove helpful in delineating specific high risk patient profiles for specific diseases, screening programs, and specific treatment modalities.

Disease Factors

Haynes et al. (1979) examined a number of studies which assessed the relationship between one or more features of the

disease (e.g., severity, duration, previous bouts and hospitalization, recency of last attack, length of stay in hospital, clinical improvement, concurrent conditions) and patient compliance and found that disease factors are relatively unimportant as determinants of compliance. However, they do note the following exceptions: (a) psychiatric patients with schizophrenia, paranoid features, and personality disorders are less compliant than other medical patients, suggesting that psychiatric patients in general tend to be low compliers; (b) increasing symptoms may be accompanied by decreasing compliance; and (c) increased disability may be associated with increased compliance.

Therapeutic Regimen Factors

Many features of the therapeutic regimens studied have been found to be associated with compliance. The duration of treatment has an unequivocal negative effect on compliance in that compliance to treatment decreases with time (Haynes et al., 1979). For example, Haynes and coworkers reviewed 23 studies and found 13 negative associations, 1 positive association, and only 9 without any associations. The review of Haynes et al. (1979) reveals that the more complex the treatment regimen in terms of number of medications, frequency of administration, and/or intricacy of dietary restrictions, the lower the compliance rate. In addition,

Haynes et al. (1976) have pointed out that the tendency of patients to react negatively to more complex treatment regimens also may be related to the degree of behavioral change required of them, a factor that also appears to be associated with noncompliance.

Compliance is most notably achieved when patients are able to either comply passively or with a minimum of disruption of routine life styles (Davis, 1967). Haynes (1979) has proposed that there is a gradient of compliance which is highest when a new activity, such as taking medication, is required and is lowest when personal habits such as smoking and alcohol consumption must be discontinued. Although side effects of medication regimens have been reported to cause noncompliance (Blackwell, 1973; Irwin, Weitzell, & Morgan, 1971; Nelson, Gold, Hutchinson, & Benezra, 1975), Haynes et al. (1979) have noted in their review of this topic that most of the available evidence does not support this popular association.

In addition to the actual content of the treatment regimen demands and restrictions, the clinical setting has been investigated as a potential source of variance in compliance. The clinical setting involving inpatient, day treatment, or outpatient treatment, with their varying levels of available supervision, has been found to be related with progressively lower levels of treatment compliance as supervision decreases (Hare & Wilcox, 1967; Irwin, Weitzell, & Morgan, 1971). Convenience of the clinic and

absence of long waiting times for treatment also have been found to relate to compliance in terms of the patient keeping appointments (Alpert, 1964; Davis, 1968). Rockart and Hofmann (1969) in a hospital outpatient setting found that, when all patients were scheduled at the same time and seen on first-come, first-serve basis, the no-show rate was 27%. However, when patients were provided individual appointment times, the no-show rate diminished to 13%.

Psychosocial Factors

A large number of psychosocial factors have been examined with regard to compliance. Table 2.1 summarizes the findings of a majority of those studies reviewed by Haynes et al. (1979). The psychosocial factors that have received the most current emphasis include locus of control, health beliefs, and social systems factors.

Health belief model. The health belief model in general posits the patients' decisions to comply with a prescribed treatment regimen are influenced by the following: their perceptions of potential severity of the illness or condition; perceptions of vulnerability to the illness or condition; health motivation; beliefs about the relative efficacies of alternative actions; beliefs about potential physical, economic, and psychological costs of initiating or continuing the recommended

Table 2.1

Summary of Psychosocial Factors Studies

Factor	Association with Compliance		
	Positive	Negative	None
Influence of family	15	0	6
Influence of friends	4	1	4
Family stability	8	0	3
Interpersonal relationships	2	0	0
"Good" social environment	1	0	1
Social isolation	1	3	3
Social participation/integration	3	0	3
Alcoholism	0	3	0
Ever abuse alcohol	0	3	2
Concurrent drug abuse	1	2	1
Pretreatment level of function	1	0	0
Resolution of conflicts	0	0	1
Sports participation	0	0	1
Self-confidence about ability to comply	1	0	0
Dependency	1	3	1
Locus of control (active versus passive)	2	1	2
Futuristic orientation	2	0	1
Anxiety/nervousness		3	2
Personality (MMPI, etc.)	3	1	8
Stable personality	3	0	0
Unreliable personality type	0	2	0
View of disease as stigma	0	1	0
Self-concept	1	1	1
Low self-esteem	0	1	2
Acting out behavior	0	1	1
Denial of sick role, illness	0	0	2
Acceptance of diagnosis	1	0	0
Low frustration tolerance	0	2	0
Motivation	4	0	0
Avoiding responsibility	0	1	0
Neuroticism	0	2	0
Extroversion	1	0	2
Responsive, cooperative, grateful	1	0	0
Authoritarian, overbearing, demanding	0	1	0
Acceptance of sick role	1	0	1
Depression	1	1	0

regimen; and stimuli or cues which might initiate health behavior (Becker, Haefner, Kasl, Kirschtz, Maimen, & Rosenstock, 1977, p. 40).

A vast body of research has been generated by this model. Many recent studies have provided findings consistent with the Health Belief Model (Calnan & Moss, 1984; Cummings et al. 1982; Ferguson & Giles, 1979; Roberts, Smith, Bennett, Cape, Norton, & Kilburn, 1984; Windsor, Heard, Reese, Morris, & Bartlett, 1983). However, two critical reviews of the literature on the model (Haynes et al. 1979; Sackett & Snow, 1979) concluded that the overall pattern of findings are contradictory to the model with as many studies reporting nonsupportive findings as supportive ones.

Locus of control. Locus of control is a personality trait. It refers to individuals' generalized tendencies to believe that reinforcements or events occur in their lives as a result of internal (personal behaviors or attributes) or external (environmental forces such as fate, chance, or socio-political) actions (Rotter, 1966). A number of empirical investigations have been done to determine the relationship between locus of control and compliance. Most of those studies have predicted that patients with an internal locus of control would be more compliant to medical regimens than those with an external locus of control. However, the reported findings to date have been mixed. Several studies from the hemodialysis compliance literature are illustrative of those contradictory findings. Poll and DeNour

(1980) and Wenerowicz, Riskind, & Jenkins (1975) have reported a positive association between compliance and internal locus of control, while others, Blackburn (1977) and Towne and Alexander (1980) have reported finding no significant relationship.

Social system factors. Several social system factors have been found to be associated with compliance (Haynes et al., 1979). The major focus area of this research is on the patients' family system. Haynes et al. (1979) reported 15 studies supporting a positive relationship between influence of the patient's family and compliance. Eight studies revealed that family stability is an important positive factor for compliance (Haynes et al., 1979). Other family factors reported to be positively associated with compliance include family support (DeNour & Czackes, 1972) and marital adjustment (Farmer, Benwick, Parsons, & Snowen, 1979; Hartman & Becker, 1978; Steidl et al., 1980). Another review of social systems research has been on social isolation. In a review by Haynes et al. (1979) they reported three studies that revealed a negative association between social isolation and compliance. Mushlin & Appel (1977) has also commented on the poor compliance level seen in socially isolated patients.

Strategies for Improving Compliance

With the growing awareness of the magnitude of the problem of noncompliance to medical regimens and the gradual realization of health professional roles in influencing that problem, numerous strategies to improve or enhance the likelihood of compliance have been cited in the literature. Broadly speaking, studies of intervention strategies have consisted of health education or behavioral strategies.

Health Education Strategies

Health education may be defined as any combination of learning procedures designed to help patients adopt behaviors conducive to health (e.g., increase compliance). Patient health education is a recognized important aspect of most, if not all, treatment regimens (Masur, 1981). Some of the most commonly used patient education strategies includes brief health messages, individual patient counseling, counseling plus written instructions, and programmed instructions.

A number of investigators have employed brief health messages to increase compliance, even though the findings have been inconsistent and sometimes contradictory (Behm & Lane, 1983; Glanz & Scholl, 1982; Swain & Sackett, 1978; Weinstein, Fiset, & Lancaster, 1983). Behm and Lane (1983), using brief fixed content health messages for patients on a weight loss program, found increased compliance to the dietary regimen. Swain and Sackett

(1978), on the other hand, found a decrease in compliance to an antihypertensive regimen following brief health messages about the treatment regimen. Glanz and Scholl (1982) report increased compliance in a group of hypertensive patients evidenced by improved blood pressure control.

Several studies have been cited in the literature pertaining to the provision of individual patient counseling to increase compliance. Individual patient counseling has been provided by physicians (Porter & McCullough, 1972), physician assistants (Vidt, 1978), nurses (Romankiewicz, Gotz, Capelli, & Carlin, 1978), pharmacists (Schneider & Cable, 1978), physical therapists (Mayo, 1978), lay counselors (Hovell, Geary, Black, Kamachi, & Hirk, 1984) and professional health educators (Meyer & Henderson, 1974), with generally mediocre success of increasing compliance.

Surprisingly, limited research has been conducted using counseling plus written instructions. In one study Reheder et al. (1980) combined pharmacists' counseling, written information on the causes and effects of hypertension, and written instruction on how to implement the hypertensive regimen. Unfortunately, the procedure did not increase compliance. However, Haynes (1979) in a review on short-term medical regimens and compliance improvement concludes that increased compliance may be achieved by providing explicit verbal and written instructions with the medication prescription.

Programmed instructions have been found to be effective in teaching patients involved in complex medical regimens (Haynes, 1979). For example, this approach has been used to increase compliance among hypertensives (Sackett, Haynes, Gibson, Taylor, Roberts, & Johnson, 1977) and juvenile diabetics (Etwiler & Robb, 1977).

Behavioral Strategies

A number of behavioral strategies have been employed to improve patient compliance to medical and dietary regimens (Epstein & Cluss, 1982; Haynes et al., 1979). Behavioral strategies are generally those procedures that attempt to increase compliance behavior directly through the use of techniques such as reminders, self-monitoring, and reinforcement. Research studies on behavioral strategies may be categorized as stimulus control, self-control, and reinforcement control (Epstein & Cluss, 1982).

Stimulus control techniques commonly used include increasing pill salience (Epstein & Masek, 1978) and tailoring the drug regimen (Norell, 1979). Epstein and Cluss (1982) have reviewed these techniques and concluded that the techniques generally increased compliance. It should be noted however, that experimental results have been contradictory and what procedures are effective in particular types of regimens are still unknown.

Self-control techniques includes self-regulation of dosage (Nessman, Carnahan, & Nugent, 1980), self-monitoring of symptoms (Carnahan & Nugent, 1975; Epstein et al., 1981; Johnson, Taylor, Sackett, Dunnett, & Schiniza, 1978) and self-monitoring of

medication (Epstein & Masek, 1978; Epstein et al., 1981; Wandless & Davie, 1977). These techniques overall have shown small effects on compliance according to Epstein and Cluss (1982) in their review.

Reinforcement control methods generally consist of three strategies: reinforce symptom reduction, reinforce medication use, and reinforce drug feedback. Epstein and Cluss (1982) in their summary of behavioral approaches to improve compliance, report the successfulness of drug feedback with at least two different populations, asthmatics (Envy & Goldstein, 1976; Sherwin et al., 1973) and epileptics (Gibberd, Dunne, Handley, & Hazelman, 1970; Lund, Jorgensen, & Kuhl, 1964). Improved compliance was demonstrated by both increases in the therapeutic dose range and decreases in symptoms of patients. Empirical support for the effectiveness of reinforcement for symptom reduction and reinforcement for medication use also has been provided (Bigelow, Strickler, Liebson, & Griffiths, 1976; Epstein et al., 1981; Epstein & Masek, 1978; Haynes et al., 1976).

Hemodialysis: An Overview

Chronic renal failure (CRF) is that stage of renal function characterized by sustained and irreversible kidney damage in which normal kidney function is inadequate to maintain a normal internal milieu in both volume and composition. Uremia is the term generally applied to the clinical syndrome observed in patients suffering from chronic renal failure regardless of etiology.

Uremia or end-stage renal disease is the inexorable phase of renal failure resulting in death if not augmented by artificial means. There are three primary treatment options available to patients with chronic renal failure. These are renal transplantation, peritoneal dialysis, and hemodialysis. The first two are presently limited in extent and not within the purview of this research.

Renal transplantation. Transplantation of the human kidney is now a justified procedure for the treatment of advanced chronic renal failure. Patients with successful renal transplants are capable of prolonged survival. They may be better rehabilitated because of the absence of anemia, hypertension, and other medical complications; the lack of a restricted diet, and the freedom from being tied down to a dialysis machine two or three times a week, with the potential of becoming a social invalid. Tens of thousands of such procedures have been performed worldwide, occurring at the rate of 50 or more per year in some medical centers (Brenner & Lazarus, 1983). However, due to the limited availability of living as well as cadaver donors, and the frequency of immunological rejection, the ability of transplantation to serve the needs of a significant number of patients suffering from chronic renal failure decreases the overall availability of this treatment option.

Peritoneal dialysis. Peritoneal dialysis is a technique wherein waste products are removed from the body by perfusing dialysis solution through the peritoneal cavity via an indwelling catheter. This procedure may be performed in various settings and

with a number of different techniques. In patients with chronic renal failure, continuous ambulatory peritoneal dialysis (CAPD) is usually performed by the patient. The procedure involves instilling fluid into the peritoneal cavity, sealing the catheter, continuing in a ambulatory mode, emptying the peritoneal cavity every four to six hours, and replacing the dialysate. CAPD is used in a small proportion of chronic renal failure patients. This limited use is due to a number of reasons including amount of treatment time (32-42 hours per week) and medical complications such as catheter tunnel infections, chronic risk of peritonitis, and moderate protein loss. In addition, these patients must display an even higher degree of treatment regimen compliance because they are self-providers of this technique.

Hemodialysis. The most widely used treatment option for chronic renal failure patients is hemodialysis which is the focus of this review. Hemodialysis employs the process of diffusion of a patient's blood supply through a machine across a semipermeable membrane to remove unwanted waste substances from the blood while adding desirable components. A constant flow of blood on one side of the membrane and a cleansing solution called dialysate on the other allow removal of waste products similar to that of glomerular filtration. This procedure allows patients with chronic renal failure to maintain a relatively healthy state.

It was not until the early 1960s with the development of the arteriovenous shunt and the arteriovenous fistula (which allow for repeated treatments) that the current practice of chronic

hemodialysis became possible (Brescia, 1966). Even though over the past two decades the pace of advances in the techniques of hemodialysis has been limited to refinements in technology, hardware, and alterations in clinical approaches, there has been a tremendous increase in the extent of utilization of hemodialysis (Lazarus & Kjellstrand, 1981). Most patients now only require between 10 and 15 hours of dialysis usually divided into three sessions per week (Schwartz, 1984).

Perhaps the major factor in the dramatic increase in the utilization of chronic hemodialysis has been adequate funding rather than the advancement of technology. In 1972 federal legislation was passed by Congress providing coverage under Medicare for patients with chronic renal failure. During the last decade in the United States, this has led to the development and radical proliferation of programs offering a wide spectrum of treatments, including hospital or medical center dialysis, satellite and home dialysis, and transplantation (Schwartz, 1984).

In 1984 there were approximately 70,000 chronic renal failure patients in this country alone on chronic hemodialysis at a cost of about two billion dollars per year (Schwartz, 1984). The mean age for patients on hemodialysis is the late 1950s, primarily because renal disease and eventually renal failure is associated with other paronchymal diseases that occur in older patients, and the current selection process favors transplantation in younger patients. Hemodialysis patients extend the whole age spectrum, including

children and adolescents. Critical in the understanding of chronic hemodialysis treatment compliance is the magnitude of the strict life changes imposed by this treatment program. The hemodialysis treatment regimen demands alteration in daily attitudes and behaviors that are rivaled in extent by few other complex therapeutic modalities.

The Hemodialysis Treatment Regimen

While the advent of hemodialysis has permitted patients with chronic renal failure to survive for prolonged periods, hemodialysis patients face alterations in lifestyle far exceeding the requirement of being attached to a machine at a dialysis center or their homes for 3 treatments per week for 3-6 hours per session. Prior to the institution of dialysis, the patients and their families generally receive considerable teaching about the uremic process, the hemodialysis process, and the therapeutic regimen. The latter regimen includes information about the dietary and fluid restrictions, medications, dialysis schedule demands, and shunt care. This aquisition of complex medical knowledge is essential for patients to be able to care for themselves.

The next step in getting ready for hemodialysis is to have an arteriovenous fistula created from a native vein, but if not available, a prosthetic conduit between an artery and a nearby vein may be utilized. Cannulation of arteriovenous fistulas with large-bore needles allows blood flow sufficient enough to carry out hemodialysis. Unfortunately, infection, thrombosis, and aneruysm

formation also occur in the arteriovenous fistula; therefore, patients have to routinely devote considerable time to keeping their fistula clean in order to reduce the incidence of these complications.

Once patients have been prepared to begin hemodialysis, they are placed on a very restricted and often unacceptable dietary regimen. This restrictive diet is due to the fact that chronic renal failure patients are unable to eliminate excess fluid and toxic waste materials between dialysis sessions. A prototypical dietary regimen has been defined by Czackes and DeNour (1978) as including the following limitations per day: fluid (800 milliliters), sodium (50 mEq), potassium (44mEg) which limits fruit and vegetable intake particularly, protein (1-1.2 grams/kilograms of body weight), calcium and phosphorus supplementations (doses must be individualized due to a wide variation in patient requirements), and calories (2500-3000).

A number of hemodialysis researchers have noted the unacceptable response of patients to these intake restrictions based largely on complaints of blandness and tastelessness due to low sodium levels (Abram, 1974; Czackes & DeNour, 1978; Levy, 1974), and frequent complaints of chronic thirst due to fluid restrictions. Why patients who are in general physiologically overhydrated so pervasively experience intense thirst is unknown (Czackes & DeNour, 1978), but it is this fluid restriction which is least adhered to regardless of the potentially ominous effects. These restrictions are coupled with the routine scheduled

administration of multiple medications including phosphate binders to reduce bone degeneration, iron supplements to combat anemia, insulin injection for diabetes, and antihypertensives for hypertension.

Finally, the necessity of frequent hemodialysis sessions considerably restricts the ability of chronic renal failure patients to travel more than a short distance from their home community. Additionally, disruption occurs in the patient's home environment due to the frequency and amount of time on the machine or in work scheduling. Thus the hemodialysis regimen is one of the most demanding treatment modalities for patients in terms of self-monitoring, multiple medication regimens, and dietary/fluid restrictions.

Therefore, as will be discussed later in this review, the hemodialysis treatment regimen is one of the most difficult medical regimens with which to achieve complete compliance in spite of the ominous consequences for the patient's medical functioning. Unfortunately, however, even in those patients who would adhere to the demands of the treatment program satisfactorily, thus receiving optimal dialysis therapy, hemodialysis is not a panacea for patients with chronic renal failure. Some abromalities resulting from chronic renal failure fail to respond fully while others may even progress despite hemodialysis treatment. Furthermore, as with many modern and complex therapeutic modalities, hemodialysis itself may be responsible for the onset of unique medical and psychological complications not seen prior to initiation of therapy.

Clinical Spectrum of Medical Complications in Chronic Hemodialysis

Cardiovascular and pulmonary complication. Fluid retention in chronic hemodialysis patients often results in congestive heart failure and/or pulmonary edema (Brenner & Lazarus, 1983). These disorders are commonly seen in hemodialysis patients who fail to comply with fluid restrictions (Czackes & DeNour, 1978). Arterial hypertension is the most commonly observed complication of end-stage renal disease with fluid overload being the major cause (Brenner & Lazarus, 1983). Usually, the normotensive state can be restored by dialysis. However, some patients remain hypertensive despite rigorous salt and water restriction and ultrafiltration because of hyperreninemia; therefore, antihypertensive drug therapy in addition to dialysis are required (Brenner & Lazarus, 1983).

Uremic pericarditis also can develop in patients who are well-dialyzed. This development has been noted in some 50% of dialysis patients (Czackes & DeNour, 1978). Brenner and Lazarus (1983) state that chronic hemodialysis patients who have been followed over the past 10 years or more reveal the disturbing occurrence of accelerated atherosclerosis, leading to development of significant coronary cerebral and peripheral vascular disease. Some of the causes of these complications such as metastic, vascular, and myocardial calcification interfere with the atrioventricular conduction system of the heart, and have been known to cause atrial fibrillation (abnormal rapid heart rhythm) and sudden death (Brenner & Lazarus, 1983). It has been noted

through clinical experience over the last decade or more that cardiovascular disease (predominately, accelerated atherosclerosis) is the leading cause of death in chronically dialyzed patients and thus plays a major role in determining the length of survival on chronic dialysis (Fortner-Frazier, 1981).

Hematologic complications. Normochromic, normocytic anemia is commonly observed in CRF patients, though it is often improved with regular dialysis and iron supplements. It contributes to fatigability and listlessness (Brenner & Lazarus, 1983). In addition to the anemia of uremia, other contributing factors are (a) hemolysis (separating hemoglobin from corpuscles) which leads to increased red blood cell loss and (b) gastrointestinal and chronic dialyzer blood loss, which is exaggerated in hemodialysis patients because of the need for heparin (during dialysis) and oral anticoagulants (between dialysis) to minimize clotting of vascular access devices.

Abnormal hemostatis is another common hemotologic complication of uremic patients. It is characterized by easy bruising and abnormal bleeding into gastrointestinal tract, pericardial sac, and intracranial vault (in the form of subdural hematoma or intracerebral hemorrhage). Finally, a wide variety of changes in leukocyte formation and function are noted in CRF patients leading to enhanced susceptibility to infections. Enhanced susceptibility to infections is further aggravated by a tendency for uremic patients to have less fever in response to infection thus making it more difficult to recognize.

Gastrointestinal complications. Common gastrointestinal abnormalities include gastrointestinal bleeding, refractory ascites (abnormal fluid retention in the abdominal cavity), and viral hepatitis. Hepatitis, though not a complication of chronic renal failure per se, is a common problem (found in 5 to 10 % of chronic dialysis patients and in 2 % of dialysis direct care personnel) in chronic dialysis patients because of frequent blood transfusions (Brenner & Lazarus, 1983).

Endocrine-metabolic complications. With the initiation of hemodialysis, the incidence and severity of renal osteodystrophy (bone disease) increases with the duration of hemodialysis (Fortner-Frazier, 1981). Management of these patients includes the use of phosphate binding medications. Other endocrine-metabolic complications are (a) extremely rare incidence of pregnancy in chronically dialyzed women (despite optimal hemodialysis therapy) and (b) impotence, oligospermia (decrease in the number of sperm in the semen), germinal cell dysplasia, and reduced plasma testosterone levels common in men (Brenner & Lazarus, 1983). These and other psychosexual dysfunctions in chronic hemodialysis patients will be examined more comprehensively later in this review within the context of psychological complications.

Dermatologic complications. Skin abnormalities include pallor, ecchymosis, hematomas, excoriations, uremic frost (a fine white powder found on the skin surface after urea concentrations in sweat evaporates), and uremic pruritus (severe itching) (Brenner & Lazarus, 1983). Although many of these cutaneous complications

improve with hemodialysis, uremic pruritus may persist and is usually resistent to most systemic and topical medications. Therefore, patients' chronic scratching injures the skin causing the development of superficial infections.

Neuromuscular complications. Two types of neurological abnormalities appear to be unique to hemodialysis patients. First, dialysis disequilibrium syndrome occurs during the first few hemodialysis therapies in association with rapid reduction of blood urea levels. The clinical symptoms of nausea, vomiting, drowsiness, headache, and even grandmal seizures, which characterize this syndrome, have been attributed to the more rapid (dialysis-induced) reduction in osmolality of extracellular fluids within the cranium. This reduction leads to cerebral edema, raised intracranial pressure and in some cases, even death (Brenner & Lazarus, 1983; Stewart & Stewart, 1979; Czackes & DeNour, 1978). The other abnormality, dialysis dementia, is seen in patients who have been on hemodialysis for a number of years. This syndrome is characterized by speech dyspraxia, myoclonus, dementia, and eventually seizures and death (Brenner & Lazarus, 1983).

Psychosocial Adjustment Aspects of Chronic Hemodialysis

Over the course of the last two decades a vast and complex body of literature has addressed the psychosocial problems encountered by patients with chronic renal failure being treated by chronic hemodialysis. These studies have attempted to assess the

variables that might influence the level of psychosocial adjustment achieved by patients surviving on chronic hemodialysis. Although patient compliance behavior can be considered as a part of psychosocial adjustment because (it represents the interface of the individual patient responses with the health care delivery system), it will be considered separately because it is the dimension of psychosocial adjustment which has been isolated for investigation in the design of this research study.

Numerous studies of the incidence of psychological complications in dialysis patients have been reported though contradictory in nature. Nonetheless, Armstrong (1978) concluded from reviewing 19 studies that approximately 50% of the hemodialysis population suffer from significant psychopathological symptoms at a rate 3-5 times greater than the general population. Seven major problems will be considered below to briefly summarize the available evidence on the psychological complications of chronic hemodialysis. They are denial, depression, dependency, anxiety, psychosis, suicide, and psychosexual dysfunctions.

In the face of the stress of hemodialysis, denial is the most frequently utilized psychological defense mechanism. While most investigators agreed on the magnitude of utilization, there is considerable disagreement as to the adaptive efficacy of this defensive strategy. Freyberger (1973) studied 23 patients and concluded that the heavy reliance upon denial was at great cost to the patient. Denial prevents adequate expression of aggression

thereby exacerbating the potential for depression and reducing the patient's capacity for adaptation to changes in relationships with significant others. Sand, Livingston, & Wright (1966) studied 17 patients and concluded that the observed excessive denial was problematic in terms of patients' denial of the seriousness of their illness and leads to decreased compliance with the unpleasant treatment regimen. Sand et al. (1966) used the MMPI ratings of increased scores on the Hysteria and Hypochondriasis scales as reflective of a tendency towards denial.

Glassman and Siegel (1970) in their study of seven patients, concluded that denial was adaptive to a point, but in some patients approached the level of being delusional and ultimately contributed to decreased compliance. Yanagida (1981) concluded in a study of 30 patients using the Marlowe-Crown Social Desirability Scale, the Beck Depression Inventory, and Internal-External Scales that all hemodialysis patients in the study utilize denial as a "stress buffering" mechanism (p. 278) which reduces depression and feelings of helpless dependency. At the same time some patients over-utilize denial and fail to comply adequately.

Reports that some hemodialysis patients appear to use denial adaptively can be related to the work of Levy (1981). Levy found that patients who deny feelings of helplessness and isolate themselves emotionally from other dialysis patients appeared to show improved survival rates. This conclusion was reached on the basis of interviewing dialysis staff members and thus is subject to

the effect of observer bias. Short and Alexander (1969) have suggested that denial is adaptive to the degree that it fosters the sense of hope for rehabilitation and thus forestalls despair.

A way of explaining the contradictory findings in the denial literature has been presented by Beisser (1979). Beisser suggested that two types of coping mechanisms may be involved. Beisser defines the two types as denial of illness, which can lead to noncompliance and negative health impact, versus affirmation of health, which can be conceptualized as an adaptive rallying of the patient's residual assets. Though Beisser's model may have some potential explanatory power the only investigator who has attempted to examine this model in a direct study of dialysis patients is Yanagida (1981) who found no evidence of this distinction operative in treatment compliers compared with treatment noncompliers.

Most reports on depression generally agree that it is the most common psychological complication of hemodialysis (Lefebvre, Nobert, & Crombez, 1972), and that a majority of chronic hemodialysis patients suffer from it (Czackes & DeNour, 1978). The incidence of depression has varied from study to study. A number of studies have used psychological tests to measure depression and have found hemodialysis patients to be significantly more depressed than the normal population. Studies utilizing the MMPI have shown that hemodialysis patients have significant elevated scores on the Depression Subscale (Pierce, Lawton, Freeman & Feasing, 1973; Wright, Sand, & Livingston, 1966; Ziarnick, Freeman, Scherrard, & Calsyn, 1977).

The KDS-2 Scale has also been used to assess depression in dialysis patients. This scale revealed significant elevations of depression scores in dialysis patients (Steele, Finkelstein, & Finkelstein, 1976). Utilizing the Heimler Scale, Holcomb and MacDonald (1973) found 40% of their dialysis patients were depressed. The Beck Depression Inventory has also been administered to hemodialysis patients. These patients achieved a mean score of 13 as compared to a cited general population mean of 10 on this inventory (Ward, Mendelson, & Erbaugh, 1961; Yanagida & Strelter, 1979).

It should be noted that Yanagida and Strelter (1979) have questioned the usefulness of these standardized tests with hemodialysis patients because the lack of normative data for this patient population makes comparison with other groups difficult. In addition, they suggest that tests such as the Beck and KDS-1 which contain items regarding physical symptomatology have a built-in source of error for a patient population where physical symptoms are so pervasively prevalent.

DeNour (1978) in a study of 32 hemodialysis patients found that 37% were moderately depressed and that 13% were severely depressed. In another study, DeNour and Czackes (1976) found that 53% of the 100 patients from 7 dialysis units suffered from moderate to severe depression. Shea, Bogdan, Freeman, and Schreiner, (1965) cited the incidence of severe depression at a rate of 60% among their hemodialysis patients studied.

In a four-year study of 25 hemodialysis patients using clinical interviews prior to dialysis and at follow-up evaluations, Reichman and Levy (1972) reported that 9 of the patients had been depressed prior to the onset of chronic renal failure but that all 25 were clinically depressed as hemodialysis began. Hagberg (1974) studied 23 hemodialysis patients and reported that 45% (11) of them were clinically depressed based on psychiatric interviews. In summary, the sample size of the above studies has been relatively small and the validity of the test used to assess depression in hemodialysis patients has been questioned. However, the weight of the evidence indicates that depression is a frequent psychological complication of hemodialysis.

Closely related to the high prevalence of depression in hemodialysis patients is the issue of emotional dependency. Several authors have concluded that dependency is a major problem and source of psychological disturbance for hemodialysis patients (Abram, 1968; DeNour, Shaltiel, & Czackes, 1968; Reichman & Levy, 1972; Shea et al. 1965; Wright et al. 1966). The dependency-independency conflict is an inescapable reality given that survival of these patients is dependent on the frequent and time-consuming hemodialysis treatment regimen, the medical staff, and often society at large to subsidize the treatment. All of these significantly restrict the freedom and independence of the patient.

Such dependency often leads to feelings of helplessness and rage (Nadelson, 1971), and it is these feelings of rage that constitute another area of conflict and psychological disturbance.

While the fact of increased aggression is described by some writers (DeNour et al., 1968; DeNour & Czackes, 1976; Reichman & Levy, 1972; Wright, Sand, & Livingston, 1966), other writers note the difficulties and anxiety many patients have in expressing their anger (Halper, 1977; MacNamara, 1967). Expression of this anger and rage risks rejection, withdrawal, and even punishment by those upon whom the patients are so totally dependent.

The literature regarding the frequency and severity of anxiety in chronic hemodialysis patients is extremely inconsistent. Reports have ranged from prominent anxiety in all the patients studied (Isiadinso, Sullivan, & Baxter, 1975) to finding no significant elevations in anxiety using such standard anxiety scales as the Taylor Manifest Anxiety (DeNour et; al. 1968) and the Shipman Anxiety and Depression Scale (Glassman & Siegal, 1970) to a complete absence of overt anxiety (Short & Wilson, 1969). Studies that have found evidence of anxiety in hemodialysis patients, though low (Czackes & DeNour, 1978), also usually report that the low levels are accounted for by the frequent use of denial as a defense mechanism. However, other writers have cited frequent clinical manifestations of patients' anxiety while on dialysis including insomnia, difficulty in concentration, and excessive masturbation (Abram, 1972).

In general, studies tend to agree that anxiety, when present, is higher while patients are actually experiencing the hemodialysis procedure itself even to the point of some patients demanding shortening of the dialysis hours (Czackes & DeNour, 1978). The

basic clinical impression is that most of these requests are due to anxiety, though there may be other reasons such as chills and muscle cramps. There have been a number of reports in the literature of cases of transient psychoses in hemodialysis patients even though the exact frequency is not yet known. In the early years of chronic hemodialysis, the frequency seemed to be slightly higher than it is today. For example, Gonzalez, Pabico, Brown, Maher, & Schreiner (1963), reporting on four patients, noted that one patient developed a severe enough case of paranoid psychosis after one month of hemodialysis that treatment had to be terminated. Shea et al. (1965) reported that out of eight patients on hemodialysis three of them developed psychotic symptomatology and that all of them developed severe psychiatric complications. The authors' opinion was that the additional stress of dialysis precipitated these severe complications.

Acute psychotic episodes (usually with hallucinations and delusions) have been reported in a number of detailed case reports (Merrill & Collins, 1974) with some of these reports indicating an acceptance or rejection of organic causes (Cooper, 1967; Merrill & Collins, 1974). Wijsenbeek and Munitz (1970) on the other hand differ in describing psychotic states in hemodialysis patients by regarding them as organ (toxic) psychosis.

Glick, Goldfield, and Kovnat (1973) in summarizing the above mentioned cases suggested that the clinical spectrum of psychotic disorders in hemodialysis patients ranged from typical organic brain syndrome, followed by schizophrenic syndromes usually without

a thought disorder, to typical psychotic depression. They suggested pathogenesis of these disturbances has been related to rapid metabolic changes together with environmental stresses. In a more recent review of the literature Levy (1976) stated that psychosis, though a relatively uncommon complication of chronic hemodialysis, does occur. Even though it is sometimes a part of an organic reaction to medical and/or surgical complications, psychosis can even continue and worsen in those cases where psychosis was a problem before beginning a dialysis program.

Czackes and DeNour (1978) reported that their experiences have been somewhat different than those reported above. They cited that 18% of their sample of 100 patients on hemodialysis developed transient psychotic symptoms over a five-year period all with paranoid symptoms (usually regarding the treatment staff) associated with severe depression and periods of stress (often related to medical problems), thus indicating that the paranoid reactions were of a "psychogenic" origin rather than organic. They emphasized the importance of this complication because in their samples who showed psychotic symptomatology, there was a 55% morality rate compared to 35% in the group without such symptoms. The "psychogenic" nature of this psychotic symptomatology increased the mortality rate by noncompliance and in some cases by suicide.

Czackes and DeNour (1978) indicate that there are three dimensions of suicide that need to be considered when addressing this psychiatric complication of hemodialysis patients. They are suicidal ideation, attempted suicide, and fatal suicide.

Suicidality has been found in a considerable proportion of the hemodialysis population (Abram, Moore, & Westervelt, 1971; Czackes & DeNour, 1978; Foster et al. 1973; Haenel, 1980). Abram et al. (1971), in a questionnaire study including a sample of 3,478 living and dead dialysis patients from 127 dialysis centers, reported a suicide frequency of 5% translating into a suicide incidence rate of more than 400 times that of the general population. However, when strictly defining suicidality, as above, the incidence rate drops to 100 times that of the general population.

Holcomb and McDonald (1973) and Foster, Cohn, and McKegney, (1973) reported 35% and 45% of their samples expressed suicidal thoughts with the latter stating that 19% actually attempted suicide. During a five-year study of 100 dialysis patients, Czackes and DeNour (1978) report that 27 out of 100 (27%) expressed suicidal ideation, with 2 of the 27 patients actually committing suicide. Furthermore, they cited that patients expressing suicidal thoughts had mortality rates higher (61%) than those not expressing suicidal ideation (41%). They also noted that this higher mortality is caused by noncompliance with the dietary regimen, finding that 56% of the suicidal patients were noncompliant with the dietary regimen compared to 33% of the nonsuicidal patients. These last findings seem to indicate that a major problem of suicidality of dialysis patients is a slow death caused by noncompliance to the dietary regimen.

There is an extensive body of literature documenting psychosexual dysfunctions in hemodialysis patients. The prevalence of dysfunctions is unclear because comparing studies is difficult due to differences in what is studied and the methods used. Abram, Hester, and Epstein (1975) report that 80% of a survey sample of dialysis patients experienced complications with inhibited sexual excitement and desire. They state that 20% of male chronic renal failure patients never have intercourse, 55% have intercourse less than four times per month, and that 25% have intercourse more than four times per month. Larsen (1972) has cited a rate of 65% for women on dialysis not having intercourse. Larsen (1972) stated that 60% of the dialysis men he studied never have intercourse and less than 10% have intercourse more than four times a month. In a mixed sample of males and females Procci (1981) found 62% experienced psychosexual dysfunctions.

Inhibited sexual excitement is generally agreed to be the major psychosexual dysfunction, particularly in male dialysis patients. Foster et al. (1973) found that 60% of the men had inhibited sexual excitement, another 25% partially had inhibited sexual excitement, and only 15% were reporting sexual activity corresponding to predialysis levels. Abram, Hester, and Epstein, (1975) found that 80% of the dialysis males studied had inhibited sexual excitement.

Based on the above reports, it does not appear that psychosexual dysfunctions are significant concomitant psychological complications for the majority of dialysis patients.

Unfortunately, however, the evidence currently available as to the cause of the psychosexual dysfunctions in hemodialysis patients is tentative at best (Levy, 1976). Speculation on the potential organic causes include abnormal parathyroid functioning (Levy, 1976) and dialysis induced neuropathy (Czackes & DeNour, 1978). Furthermore, it has been reported that 35% of patients experienced a worsening of their psychosexual dysfunctioning after the initiation and continuance of hemodialysis (Abram et al., 1975; Levy, 1974), thus indicating that some components of the hemodialysis treatment may be a physiological cause. Psychological causes that have been hypothesized include unsatisfactory marital relations (Holcomb & MacDonald, 1973; Steele, Finkelstein, & Finkelstein, 1976) and depression (Finkelstein, Finkelstein, & Steele, 1978; Holcomb & MacDonald, 1973).

In summary, it can be agreed that psychosexual dysfunctions, specifically inhibited sexual desire and excitement, are common in the majority of hemodialysis patients and that at least three factors act, interact, and influence psychosexual dysfunctioning. These include organic factors (i.e., parathyroid functioning, dialysis induced neuropathy, and therapeutic hemodialysis), quality of marital relationship, and depression. Although there are few empirical studies, several reports document the prevalent extent and negative impact of family and marital problems, severe role disruptions in vocational and social areas, and financial responsibilities as consequences of chronic hemodialysis

(Armstrong, 1978; Reichsman & Levy, 1972; Short & Wilson, 1969; Steidl et al., 1980). These all add to the hemodialysis patient's psychological disequilibrium.

Hemodialysis Treatment Compliance

Magnitude of Noncompliance to the Hemodialysis Treatment Regimen

Compliance with the complex hemodialysis dietary and treatment regimen described earlier in this review has been an important concern of dialysis direct care personnel from the outset of dialysis utilization. The concern of dialysis direct care personnel was due to the magnitude of potential ominous medical complications and even death if patients did not comply with the regimen. Prior to 1973, much of the selection process for hemodialysis was done with the intent of providing hemodialysis to those patients who would comply with the complex regimen, and who would benefit the most from this limited available therapeutic modality. Despite the fact that noncompliance can lead to dire outcomes, the literature indicates that a significant segment of the hemodialysis population continues to be noncompliant with the treatment program.

In fact, as early as 1965, Shea et al. reported that among six out of eight patients studied, there was a "considerable amount of dietary indiscretion" (p. 558). This dietary indiscretion was in spite of the fact that "they all evidenced a clear understanding of their diet and a willingness to follow it" (p. 558). In another

study, Friedman, Goodwin, and Chaudhry, (1970) reported that 75% of the families of dialysis patients stated that the patients disliked the dialysis diet with 25% of the same patients seriously abusing the diet. DeNour and Czackes (1972) found that 65% of their sample of 43 patients were diet abusers, with 47% being rated as severe abusers. Blackburn (1977) studied 53 patients for a month on multiple compliance criteria and found that 51% were noncompliant with fluid restrictions, 38% with phosphorus restrictions, and 21% were noncompliant with potassium restrictions.

In a sample of 31 patients followed for six months, Procci (1977) found that only 12 (39%) were good compliers and 19 (61%) were poor compliers. Similarly, Czackes and DeNour (1978), in a long-term followup study of 100 patients, found that 23% were complying well with the diet, 38% complied fairly well, and 39% were classified as "abusers." Poll and DeNour (1980) studied 40 patients on chronic hemodialysis and found that 48% of the patients abused the diet restrictions. In a study including 116 patients receiving hemodialysis at 2 outpatient clinics, Cummings et al. (1982) found that 70% of the patients were not taking the phosphate-binding medicine appropriately; 14% were not following their dietary restrictions; and 41% could be classified as noncompliant in limiting their fluid intake. Yanitski (1983), in a study of 29 in-center dialysis patients who had been in the program for at least a month, found that 70% were noncompliant to fluid restrictions, 15% with potassium restrictions, and 35% took phosphate binders incorrectly.

The most extreme form of noncompliance by dialysis patients is refusal and/or withdrawal from the dialysis program. Cadnapaphornachai, Chukko, and Holmes (1974), in a study of 78 home dialysis patients over five years, found that 20% of the mortality was a direct result of refusal of any sort of treatment, and an additional 15% resulted from refusing home dialysis when no other treatment was available. Abram et al. (1971), in a large questionnaire study, found that 0.7% of the dialysis patients died as a result of refusing and/or withdrawing from treatment. Czackes and DeNour (1978), in a five-year study of 120 patients, found that 2 out of 120 patients died as a result of withdrawal from treatment.

Even though the above studies which focus specifically on refusal and/or withdrawal from treatment are sparse and difficult to assess because the mortality rates vary so extremely, they do suggest that refusal and/or withdrawal from treatment may be a common cause of death in dialysis patients. The aforementioned studies, though noteworthy for the degree of contradiction found among the various study results, clearly provide enough data to demonstrate that noncompliance with the hemodialysis treatment regimen is a widespread phenonomen among these patients.

Factors Determining Hemodialysis Treatment Compliance

Identifying patients who would be at risk for noncompliance to the hemodialysis regimen has been a goal of dialysis medical staffs ever since the inception of this treatment modality. Identifying a

high risk noncompliant patient was especially important in the early years of the 1960s, as the apparent high incidence and grave consequences of noncompliance became quickly apparent with increased hemodialysis utilization. Initially, this identification was to aid staff in their method of patient selection for the few machines that were available, but the interest in prediction continues to the present in order to anticipate patients who may need intervention at some point.

Generally, research on determining factors of compliance to hemodialysis is consistent with the larger body of literature on medical compliance. Many of the same variables have been studied such as sociodemographic factors, cognitive factors (e.g., intelligence), and psychosocial factors. Consistent also are the findings that few factors have emerged as good determinants of compliance to the hemodialysis regimen.

Sociodemographic factors. Several studies have examined the relationship between sociodemographic factors and patient compliance to hemodialysis and have reported mixed results. For example, some studies have reported a positive relationship between compliance to hemodialysis and age (DeNour & Czackes, 1976), level of education (DeNour & Czackes, 1976) and marital status (Towne & Alexander, 1980). Other studies have failed to find a significant relationship between compliance to hemodialysis and age (Malmquist, 1973), level of education (Foster et al., 1973) and marital status (Malmquist, 1973; Procci, 1977).

Cognitive factors. The most common cognitive factor studied has been patient intelligence. The research on the relationship between compliance and intelligence has revealed mixed results. Even though the results from these studies have been mixed, the overwhelming majority of these studies have not found any association between compliance to hemodialysis and intelligence (Borkman, 1976; DeNour & Czackes, 1972; Malmquist, 1973; Winokur, Czackes, & DeNour, 1973). Hagberg (1974) on the other hand, found that intelligence was predictive of compliance during the first six months of treatment. However, Hagberg notes that the effect of intelligence on compliance disappeared thereafter, indicating that more intelligent patients may have adjusted to hemodialysis more quickly but without lasting results. Greenberg, Weltz, Spitz, and Bizzozero (1975) indicated that the psychological affects of renal failure are likely to be associated with intellectual dysfunction. However, this dysfunction is largely reversible through dialysis.

Psychosocial factors. It has been in the area of psychosocial factors that much of the research regarding determinants of compliance has been conducted. Specific factors have included personality characteristics, locus of control, health beliefs, and socio-environmental. A number of personality characteristics have been investigated to determine a relationship with patient compliance to hemodialysis. Sand et al. (1966) tested a sample of 17 using a standard battery of psychometric tests including the WAIS, TAT, Rorschach, and MMPI as well as staff ratings. They found noncompliance in hemodialysis patients having

self-destructive wishes, conflicts with authority figures, acting-out tendencies, and self-esteem vulnerable to damage from the patient role.

DeNour and Czackes (1972) used semi-structured psychiatric interviews to assess 120 patients at the outset of hemodialysis and conducted follow-up assessments over the next five years. They found that noncompliance tended to be associated with low frustration tolerance, receiving secondary gains from the 'sick role,' and the presence of suicidal tendencies. Malmquist (1973) studied a group of 23 patients using structured interviews and rating scales and found that compliance to hemodialysis was associated with a positive attitude toward treatment. In addition, Malmquist also suggested that such an attitude was associated with such factors as (a) low levels of overt irritability, (b) low reported anxiety, (c) closeness to mother as an adult, (d) absence of dependency as a child, and (e) adaptability to previous life change. Unfortunately, these criteria would be difficult to operationalize in a replicable fashion.

The Minnesota Multiphasic Personality Inventory (MMPI) has been used to investigate the relationship between compliance to hemodialysis and personality characteristics. Denial is the only factor included on the MMPI that has consistently been shown to be negatively associated with compliance (Short & Wilson, 1969; Ziarik et al., 1977).

Locus of control is probably the most current widely studied personality characteristic. Research findings on the relationship

between locus of control and compliance to the hemodialysis, however, are mixed. Several studies (Poll & DeNour, 1980; Weneyowicz, Riskind, & Jenkins, 1978) have reported a significant relationship while other studies (Blackburn, 1977; Kilpatrick, Miller & Williams, 1972; Towne & Alexander, 1980) reported finding no significant relationship. Therefore, locus of control has not emerged as a consistent determining factor of compliance.

Research efforts on social-environmental factors determining compliance have been fruitful. The major focus of research on the effects of social environment on compliance has been on family life and the influence of the dialysis staff. Family life appears to be a particularly significant factor in compliance. A review of the literature indicates that compliance to hemodialysis is determined by mature, open, positive interactions and structure in the family (Steidl et al., 1980), family support (Cummings, 1970; DeNour & Czackes, 1972; Greenberg et al., 1975), the emotional quality of family life (Farmer, Snowden, & Parson, 1979b; Hartman & Becker, 1978), communication within the family (Pentecost, Zwerens, & Manual, 1976), the maintenance of a nuclear family (Foster et al., 1973) and marital adjustment (Somer, 1984).

Summary

A large number of studies have been presented in the psychological and medical literature dealing with the problem of noncompliance. These studies have provided the psychological and

medical practitioners with few solutions to this vast and complex problem. The compliance literature is complicated by the widely varying approaches that researchers have used to operationally define, assess, and measure compliance behavior. These differences have led to a number of methodological problems that have affected the reviewers' ability to compare and thus obtain a clear understanding of this vast and complex problem. Methods for monitoring patients' compliance behavior may be either direct or indirect. Direct methods such as blood/serum assays or urine assays are considered the most objective and accurate measures available.

Compliance appears more determined by characteristics of the medical and dietary regimen than to sociodemographic or psychosocial factors. At the broadest level, compliance is higher in short-term regimens than in long-term regimens. The more complex the treatment regimen, the lower the compliance level, particularly if it require a significant degree of behavioral changes such as dietary restrictions or in life style. Psychosocial factors such as health beliefs and attitudes, patients locus of control, and social systems (e.g., family) have been determined to be associated with compliance behavior though the findings have been in general contradictory.

A variety of health education and behavioral strategies have been used to improve compliance behavior with varying effectiveness for particular patients and health disorders. Broadly speaking,

behavioral strategies have been superior to health education approaches. However, no single behavioral strategy has been found to be superior across treatment regimens.

The hemodialysis treatment regimen is one of the most difficult medical and dietary regimens to achieve good compliance behavior due to the complexity and major behavioral changes in a patient's lifestyle and diet. The clinical spectrum of medical complications in chronic hemodialysis is vast and affects virtually every organ system of the human body. All of these complications are significantly increased when patients are noncompliant.

A vast and complex body of literature has revealed a number of psychosocial adjustment problems in chronic hemodialysis patients. The psychosocial complications have included denial, depression, dependency, anxiety, psychosis, suicide, and psychosexual dysfunctions. In addition, several reports have documented the prevalence and negative impact of family and marital problems, severe role disruptions in vocational and social areas, and financial responsibilities as a result of chronic hemodialysis.

A large number of studies have documented the widespread phenonomen of noncompliance among hemodialysis patients. Therefore, a number of factors, including sociodemographic, cognitive, and psychosocial, have been studied in order to determine their relationship with compliance behavior in chronic hemodialysis patients. The results of these studies have been mixed. For example, several studies have found a positive

relationship between compliance to the hemodialysis regimen and age, level of education, marital status, and intelligence, while others have found a negative or no relationship.

The bulk of research in this area has been to determine the association between psychosocial factors such as personality characteristics, locus of control, health beliefs, and social environments and patient compliance to the hemodialysis regimen. The results of this research have been contradictory. There is a paucity of empirical research in the hemodialysis compliance literature that has investigated the relationship between specific chronic hemodialysis patients' psychosocial adjustment factors and compliance to the hemodialysis dietary treatment regimen. Therefore, there is clearly a need for the present study in order to aid in clarifying the complex phenonmon of noncompliance in the hemodialysis patient population.

CHAPTER THREE

METHODOLOGY

The main purpose of this study was to investigate the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and hemodialysis psychosocial adjustment attitudes and behaviors. Specifically, this study investigated (a) the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their attitudes and behaviors associated with psychosocial adjustment to hemodialysis; (b) the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their ages, sex, race/ethnicity, years of education, and marital status; (c) the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their length of time on dialysis; (d) the relationship between chronic hemodialysis patients' psychosocial adjustment attitudes and behaviors and their length of time on dialysis; and (e) the relationship between chronic hemodialysis patients' psychosocial adjustment attitudes and behaviors and their ages, sex, race/ethnicity, years of education, and marital status.

Chronic hemodialysis patients with differing fluid levels of dietary compliance were compared based upon assessed attitudes and

behaviors on the Patient Adjustment to Dialysis Checklist (PADC) (Appendix A). Direct care staff nurses nonintrusively assessed patients in the following global adjustment areas using the PADC: (a) Emotional Control, (b) Active Involvement in Treatment, (c) Compliance to Medical Regimens, (d) Positive Interpersonal Behavior, (e) Independence, (f) Compliance with Dietary Restrictions, (g) Understanding of Medical Regimens, and (h) Acceptance of Treatment Restrictions. Dietary compliance was determined by measuring patients' level of compliance to fluid restrictions using routine between dialysis fluid weight gains averaged over a 12-week period prior to the staff nurses' assessments. The hypotheses, population and sample, instrument, procedures, and the analysis of data are discussed in this chapter.

Hypotheses

1. No relationship will exist between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and any of the eight subscales on the PADC.
2. No relationship will exist between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their demographic variables of age, sex, race/ethnicity, years of education, and marital status.
3. No relationship will exist between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their length of time on dialysis.

4. No relationship will exist between any of the eight subscales on the PADC and chronic hemodialysis patients' length of time on dialysis.
5. No relationship will exist between any of the eight subscales on the PADC and any of the chronic hemodialysis patients' ages, sex, race/ethnicity, years of education, and marital status.

The level of statistical significance for testing each of the above hypotheses was p .05.

Population and Sample

The sample for this study was drawn from a population which consisted of 96 adult chronic hemodialysis outpatients at the Dialysis Clinics, Inc., a non-profit corporation in Jacksonville, Florida. The patients received treatment at least three times a week at the clinic. The patient population ranged in age from 18 to 91 years with a mean age of 55. Sex of patients consisted of 55 females (57%) and 41 males (43%). Race/ethnicity of patients consisted of 57 blacks (60%), 33 whites (34%), 4 Hispanics (4%), and 2 others (2%). Years of formal education ranged from 0 to 18 with a mean of 9.5. Length of time on hemodialysis ranged from 4 to 118 months with a mean of 38.

The sample consisted of 54 patients randomly selected from the total patient population described above. The selection procedure involved assigning each individual patient a number between 1 and 96. Then, a standard random number table was used to select the first 54 patients who met the following criteria: (a) had primary

diagnosis of end-stage renal disease requiring the use of maintenance hemodialysis three times a week, (b) had undergone hemodialysis for at least six months at the clinic prior to assessments, and (c) had no physical handicap such as blindness or senility.

The resulting sample ages ranged from 18 to 86 years with a mean of 54. Sex of sample patients consisted of 30 females (56%) and 24 males (44%). Race/ethnicity of sample patients consisted of 37 blacks (68%), 13 whites (24%), 2 Hispanics (4%), and 2 others (4%). Years of formal education ranged from 0 to 18 with a mean of 9.5. Length of time on hemodialysis ranged from 6 to 118 months with a mean of 37. Marital status consisted of 29 (54%) married with a partner and 25 (46%) with no partner.

Instrument

The instrument used in this study was the Patient Adjustment to Dialysis Checklist (PADC). The PADC contains 8 subscales that include 43 items describing attitudes, general behavior patterns, and directly observable discrete behaviors that hemodialysis nurses and patients reported related to chronic hemodialysis patients' psychosocial adjustment to hemodialysis (Tucker et al., 1986). The purpose of the PADC is to provide hemodialysis personnel with a nonintrusive means of identifying specific attitudes and behaviors that can and should be monitored in order to provide a full range of quality patient care.

The development of the checklist began with publication of an article (Tucker, Mulkerne, Panides, & Ziller, 1981) that contained a list of 31 attitudes and behaviors that 22 dialysis nurses from eight randomly selected outpatient dialysis centers in Florida had reported to be characteristic of their best adjusted patients. The 31 characteristics were cited by at least 75% of the nurses. Dialysis personnel who read the nationally distributed article were invited to (a) rate the importance of the attitude and behaviors on a scale from 1--very important to 5--not important, and (b) include other attitudes and behaviors thought to be indices of patient adjustment. Readers' ratings and additions to the list of attitudes and behaviors were requested to be returned to the researchers. These ratings and additions were used in the construction of an instrument to assess patient adjustment.

The 106 responses from readers included 12 additional attitudes and behaviors believed to be characteristic of patient adjustment. These were added to the 31 rated items. The resulting 43 attitudes and behaviors were compiled into an inventory. In order to determine the importance of the 43 items for adjustment to hemodialysis, eight inventories were mailed to one outpatient hemodialysis center within each of the 50 states in the U.S. A cover letter was attached asking the unit administrator to solicit eight volunteer nurses to anonymously complete the PADCs and then return them within two weeks to the researchers. Each center within each state was randomly selected. Instructions on the

inventory were to rate each item on a scale of 1--irrelevant to 4--crucial in adjusting to hemodialysis. Nurses also were instructed to record on the inventories their hemodialysis nursing experience in years and months.

The resulting subjects were 242 hemodialysis nurses employed in 38 of the 50 centers. Experience as a dialysis nurse ranged from 1 month to 192 months (16 years) with a mean of 46.9 months (3.9 years). A factor analysis, using the principal axes method for extracting factors with Varimax rotations, was performed on the returned checklist data. All items were loaded .30 or greater on at least one unrotated and at least one rotated factor. The factor analysis revealed that all items were homogenous and were measuring one general factor--patient adjustment.

The Varimax rotated matrix reflects that the 43 items could be grouped into 8 global factors (see Appendix A) important in patient adjustment to hemodialysis. The units and percent of common variance accounted for by each factor were as follows: Factor I - 5.01 units or 24%, Factor II - 3.05 units or 15%, Factor III - 3.20 units or 16%, Factor IV - 2.52 units or 12%, Factor V - 2.71 units or 13%, Factor VI - 1.32 units or 6%, Factor VII - 1.43 units or 7%, and Factor VIII - 1.49 units or 7% of the common variance. The total of all rotated factor loadings squared is 20.71 units of total test variance thus representing 74.3% of all common variance.

Tucker's et al. (1986) also examined the interrater reliabilities for individual items and the overall PADC. They

found that the overall interrater reliability coefficient was standard item alpha .88 (p .001). The overall item interrater reliability coefficients were standard item alpha .50 (p .001) in all but 3 of the 43 items. The three exceptions were item 13, 33 and 9 (Appendix A); their standard item alphas were .17, .43, and .47 respectively. In addition, overall inter-item reliability was found to be standard item alpha = .88 (p .001) as were scale scores where the range was .83 + 0 .92 (p .001).

Procedures

The medical director and nursing manager at the Dialysis Clinic, Inc., in Jacksonville, Florida, granted approval to conduct this research project. In addition, the nursing manager agreed to be a research consultant and liaison between the researcher, dialysis nursing staff and the target sample. Thirteen dialysis staff nurses responsible for routine treatment participated in this study. The nurses' work experience in nursing ranged from 4 to 25 years with a mean of 12.19. The nurses' work experience in hemodialysis ranged from 1 to 6 years with a mean of 3.45. The nurses' work experience in hemodialysis at Dialysis Clinic Inc. ranged from .50 to 5 years with a mean of 2.75. The nurses' worked an average of 38.46 hours per week with a range from 36 to 40. The nurses' nursing educational training ranged from 1 to 2 years with a mean of 1.69. The nurses' ranged in age from 29 to 46 years with a mean of 38.54. The race of the nurses consisted of 2 blacks (15%) and 11 whites (85%).

The nurses involved in the study were informed about the purpose of the study by the researcher and the head nursing manager during a one-hour meeting scheduled by the nursing manager. The dialysis nursing staff was informed during this meeting that participation in this study was voluntary and that their names and those of the patients assessed would not be written on the checklist so as to ensure confidentiality. In addition, they were offered six hours of continuing education units for participation in this investigation. Those nurses who agreed to participate were asked to sign a consent form indicating their voluntary participation (see Appendix C).

One week prior to the training workshop the researchers collected the demographic data on the patient population and the between dialysis fluid weight gain measurements on the 54 sample patients from the medical records and charts (see Appendix C). The 13 nurses who agreed to participate were requested to attend a one-hour training workshop on using the Patient Adjustment to Dialysis Checklist (PADC). The directions for using the PADC as an assessment checklist were explained in detail by the researcher. At the end of the training, each staff nurse was given 54 copies of the PADC and a list containing the names and code numbers of the 54 randomly selected patients by the researchers.

The researcher then assigned a code number between 1 and 13 to each nurse and instructed all 13 nurses to (a) each separately complete one PADC for each of the 54 patients; (b) write their individual nurse code number and the patient code number on each

PADC completed on each patient; (c) complete all PADCs in their available time at work or at home; and (d) return all 54 completed PADCs to the head nursing manager within a two-week period. All completed PADCs were collected by the researcher, from the nursing manager,at the end of the two-week time period. Two weeks after all completed PADCs were collected by the researcher, from the nursing manager, all 13 nurses were given a demographic data questionnaire (see Appendix G), by the researcher. The nurses were instructed, by the researcher, to return the questionnaire to the nursing manager upon completion. The questionnaires were collected from the nursing manager, by the researcher, at the end of two weeks.

Analysis of Data

The investigator measured the agreement among the 13 nurses ratings for the PADC 43 items and 8 subscales in order to establish the reliability of the average ratings to test hypothesis one, four, and five (see Appendix D & E). A mean score was calculated for each of the 8 subscales on the PADC. This mean score was derived first by assigning a value of one for each item checked on the PADC by nurses for each patient and zero for each item not checked on the PADC by nurses for each patient (see Appendix E). Next, an average value between 0 and 1 was calculated for each item per patient by adding up the number of times each nurse checked that individual item. Then the investigator divided that value into the maximum number of times an item could be checked which was 13 (there were 13 raters). An overall mean score was then

calculated for each item by summing the average checked values by nurses across all patients and dividing by 54, the total number of patients in this study. Last, a mean average score for the individual subscales was calculated from the mean average scores of those items for each subscale.

For hypothesis one, Pearson Product-Moment correlations were computed to assess the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and each of their mean scores on the eight PADS subscales. These correlations indicated the pattern of relationships between levels of compliance to dietary fluid restrictions and the eight PADC subscales. In addition, a multiple regression analysis was performed to test hypothesis one with levels of compliance to dietary fluid restrictions as the dependent variable and the eight PADC subscales as the independent variables.

An analysis of covariance was used to assess the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their demographic variables of age, sex, race/ethnicity, years of education, and marital status for hypothesis two. An analysis of covariance permitted the investigator examine the relationship of levels of compliance to dietary fluid restrictions (dependent variable) to a single demographic variable (independent variables), while controlling for the other variables. In addition, Pearson Product-Moment correlations were computed to determine the pattern of relationships between levels of compliance to dietary fluid restrictions and the demographic variables.

A Pearson Product-Moment correlation was used to examine the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their mean length of time (months) on hemodialysis (hypothesis three). For hypothesis four, Pearson Product-Moment correlations were used to assess the relationship between chronic hemodialysis patients' length of time on hemodialysis and each of their mean scores on the eight PADC subscales. In addition, a multiple regression analysis was used to test hypothesis four with length of time on hemodialysis as the dependent variable and the eight PADC subscales as the independent variables.

To investigate the relationship between chronic hemodialysis patients' mean scores on the eight PADC subscales and their demographic variables of age, sex, race/ethnicity, years of education, and marital status (hypothesis five), a multivariate analysis of covariance was performed. The PADC subscales were the dependent variables and the set of demographics were the independent variables. Wilkes criterion was used as the test of significance. Partial regression correlation coefficients were used to determine the pattern of relationships between chronic hemodialysis patients' mean scores on the PADC subscales and their demographic variables. The alpha level for the above data analyses of covariances was $p < .05$.

CHAPTER FOUR

RESULTS AND DISCUSSION

The main purpose of this study was to investigate the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their hemodialysis psychosocial adjustment attitudes and behaviors. Specifically, this study investigated (a) the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their attitudes and behaviors associated with psychosocial adjustment to hemodialysis; (b) the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their ages, sex, race/ethnicity, years of education, and marital status; (c) the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their length of time on dialysis; (d) the relationship between chronic hemodialysis patients' psychosocial adjustment attitudes and behaviors and their length of time on dialysis; and (e) the relationship between chronic hemodialysis patients' psychosocial adjustment attitudes and behaviors and their ages, sex, race/ethnicity, years of education, and marital status. The results of the data analyses for the five null hypotheses, a discussion of the results, and the limitations of the study are presented in this chapter.

Results

Null Hypothesis One. Null hypothesis one stated that no relationship existed between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and any of the eight PADC subscales. Pearson Product-Moment correlations between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and each of the eight PADC subscales scores were conducted to determine the pattern of those relationships (Table 4.1). A multiple regression analysis, with

Table 4.1

Pearson Product-Moment Correlations of the Relationship Between Dialysis Weight Gains and the PADC Subscales

Subscales	Correlation Coefficients
1 (Emotional Control)	.08
2 (Active Involvement in Treatment)	.31
3 (Compliance to Medical Regimens)	-.26
4 (Positive Interpersonal Behavior)	-.11
5 (Independence)	.04
6 (Compliance with Dietary Restrictions)	-.50
7 (Understanding of Medical Regimens)	-.19
8 (Acceptance of Treatment Restrictions)	-.34

levels of compliance to dietary fluid restrictions (measured by patients' mean between dialysis weight gain) as the dependent variable and the eight PADC subscales scores as the independent variables, was used to test this hypothesis (Table 4.2).

Table 4.2

Regression Analysis of the Relationship Between Dialysis Weight Gains and the PADC Subscales

Subscales	df	F	Pr > F
1 (Emotional Control)	1	.09	.77
2 (Active Involvement in Treatment)	1	1.36	.25
3 (Compliance to Medical Regimens)	1	.54	.47
4 (Positive Interpersonal Behavior)	1	1.48	.23
5 (Independence)	1	.00	.98
6 (Compliance with Dietary Restrictions)	1	7.06	.01*
7 (Understanding of Medical Regimens)	1	.41	.52
8 (Acceptance of Treatment Restrictions)	1	.22	.64

$F = 3.17$, df = (8,44), $p = .006$*, R-square = .37

*$p < .05$

The means and standard deviations for each of the above variables are presented in Appendix F.

The overall multiple regression analysis on the data indicates that overall chronic hemodialysis patients' levels of compliance to dietary fluid restrictions in this study were significantly related to some, if not all, of the eight PADC subscales ($F = 3.17$, df = (3,44), $p = .006$, R-square = .37). The univariate regression analysis indicated that chronic hemodialysis patients' level of compliance to dietary fluid restrictions was significantly related to PADC subscale 6 (compliance with dietary restrictions) ($F = 7.06$, df = (1,44), $p = .01$). The correlation coefficient between chronic hemodialysis patients' level of compliance to dietary fluid restrictions and PADC subscale 6 was -.497. Therefore, null hypothesis one was rejected.

The above data analyses indicated that for this study a significant negative relationship existed between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and PADC subscale 6 (compliance with dietary restrictions). These results suggest that as chronic hemodialysis patients' weight gain values decreased (e.g., increasing levels of compliance to dietary fluid restrictions), their scores on PADC subscale 6 (compliance with dietary restrictions) increased. Thus, these results show that chronic hemodialysis patients in this study with increasing levels of compliance to dietary fluid restrictions were accurately assessed as displaying increasing compliance with dietary restrictions.

Null Hypothesis Two. Null hypothesis two stated that no relationship existed between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their demographic variables of age, sex, race/ethnicity, years of education, and marital status. An analysis of covariance (ANCOVA) was used to test this hypothesis (Table 4.3). The

Table 4.3

Analysis of Covariance of the Relationship Between Demographic Variables and Dialysis Weight Gains

Demographic Variables	df	Type III SS	F value	p
Age	1	4.62	7.91	.007*
Years of Education	1	.28	.48	.493
Sex	1	1.96	3.35	.074
Marital Status	1	1.04	1.78	.189
Race/Ethnicity	3	3.26	1.86	.149

$F = 3.95$, $df = (7,46)$, $p = .01$*, R-square = .31

*$p < .05$.

dependent variable was chronic hemodialysis patients' levels of compliance to dietary fluid restrictions. This variable was measured by patients' between dialysis weight gains. The independent categorical variables were sex, race/ethnicity, and marital status. The covariates were patients' ages and years of education. The means and standard deviations for each of the above variables are presented in Appendix F. Pearson Product-Moment Correlations between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and the demographic variables of age and years of education were conducted to determine the pattern of these relationships (Table 4.4).

Table 4.4

Pearson Product-Moment Correlations of the Relationship Between Dialysis Weight Gains and Age and Years of Education

Demographic Variables	Correlation Coefficients
Age	-0.369
Years of Education	-0.042

The analysis of covariance data results indicate that chronic hemodialysis patients' levels of compliance to dietary fluid restrictions in this study were significantly related to some of the demographic variables ($F = 3.95$, $df = (7,46)$, $p = .01$, R-square = .31). Thus, null hypothesis two was rejected.

The univariate analysis of covariance performed on the data resulted in identifying a significant relationship between levels of compliance to dietary fluid restrictions and chronic hemodialysis patients' ages ($F = 7.91$, df (1,46), $p = .007$). The correlation coefficient between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their ages was -0.369.

The above data analyses showed that a significant negative relationship existed between the chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their ages in this study. These results show that as chronic hemodialysis patients' weight gain values decreased (e.g. increasing levels of compliance to dietary fluid restrictions), the years of age for these patients increased. Thus, these results suggest that older chronic hemodialysis patients were more apt to comply with dietary fluid restrictions than younger patients.

Null Hypothesis Three. Null hypothesis three stated that no relationship existed between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their length of time on dialysis. A Pearson Product-Moment correlation was used to test this hypothesis. The correlation coefficient was .005 with a p-value of .971. This result indicates that no significant relationship existed between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their length of time on dialysis. This result implies that

chronic hemodialysis patients' tenure on dialysis in this study did not accurately predict their level of compliance to dietary fluid restrictions. Therefore, null hypothesis three was not rejected.

Null Hypothesis Four. Null hypothesis four indicated that no relationship existed between chronic hemodialysis patients' length of time on hemodialysis and of the eight PADC subscales. Pearson Product-Moment correlations between length of time on hemodialysis and each of the eight PADC subscales were conducted to determine the pattern of these relationships (Table 4.5). A multiple

Table 4.5

Pearson Product-Moment Correlations of the Relationship Between Length of Time and the PADC Subscales

Subscales	Correlation Coefficients
1 (Emotional Control)	.09
2 (Active Involvement in Treatment)	.20
3 (Compliance to Medical Regimens)	-.05
4 (Positive Interpersonal Behavior)	-.36
5 (Independence)	.06
6 (Compliance with Dietary Restrictions)	-.10
7 (Understanding of Medical Regimens)	-.03
8 (Acceptance of Treatment Restrictions)	-.09

regression analysis with chronic hemodialysis patients' length of time on hemodialysis (measured in months) as the dependent variable and the eight PADC subscales scores as the independent variables was used to test this hypothesis (Table 4.6). The

Table 4.6

Regression Analysis of the Relationship Between Length of Time and the PADC Subscales

Subscales	df	F	Pr > F
1 (Emotional Control)	1	.12	.73
2 (Active Involvement in Treatment)	1	.05	.82
3 (Compliance to Medical Regimens)	1	.00	.98
4 (Positive Interpersonal Behavior)	1	11.55	.001*
5 (Irdependence)	1	3.23	.08
6 (Compliance with Dietary Restrictions)	1	.25	.62
7 (Understanding of Medical Regimens)	1	.65	.42
8 (Acceptance of Treatment Restrictions)	1	.25	.62

$F = 1.87$, df = (8,44), $p = .09$, R-square = .25

*$p < .05$

means and standard deviations for each of the above variables are presented in Appendix F.

The multiple regression analysis data results indicate that there was no overall significant relationship between chronic hemodialysis patients' length of time on hemodialysis and the eight PADC subscales investigated in this study ($F = 1.87$, df = (8,44), $p = .09$, R-square = .25). These results imply that the chronic hemodialysis patients' length of time on hemodialysis did not accurately predict any of their eight PADC subscale scores. Therefore, null hypothesis four was not rejected.

However, the univariate multiple regression analysis of the data in this study showed that a significant relationship may exist between chronic hemodialysis patients' length of time on hemodialysis and PADC subscale 4 (positive interpersonal behavior) ($F = 11.55$, df = (1,44), $p = .0001$). The correlation

coefficient between chronic hemodialysis patients' length of time on dialysis and PADC subscale 4 was -0.35. Thus, as chronic hemodialysis patients' length of time on hemodialysis increase, they may display less positive interpersonal behavior.

These results imply that chronic hemodialysis patients with more time on hemodialysis may display less positive interpersonal behaviors than patients with less time on hemodialysis.

Null Hypothesis Five. Null hypothesis five stated that no relationship existed between any of the eight PADC subscale scores and chronic hemodialysis variables of age, sex, race/ethnicity, years of education, and marital status. Wilks' criterion was used as the MANCOVA test criterion for the hypotheses of no overall effect for each of the demographic variables. A multivariate analysis of covariance (MANCOVA) was used to test hypothesis five. The dependent variables were the eight PADC subscales average scores. The independent variables were the five demographic variables. Partial regression correlation coefficients were used to determine the pattern of relationships between the dependent and independent variables.

The Wilks' criterion results indicated that chronic hemodialysis patients' age ($F=5.71$ for 8 and 38 degrees of freedom and p-value of 0.0001) and years of education ($F=2.56$ for 8 and 38 degrees of freedom and p-value of 0.001) met the MANCOVA test criterion for overall effects on the PADC subscales (Table 4.7).

Table 4.7

MANCOVA Test Criteria for the Hypothesis of No Overall Demographic Variables Effects for the PADC Subscales

Demographic Variable	Wilks' Criterion	df	F	Pr > F
Age	.45	(8,38)	5.71	.0001*
Years of Education	.65	(8,38)	2.56	.02*
Sex	.85	(8,38)	.83	.59
Marital Status	.85	(8,38)	.81	.60
Race/Ethnicity	.45	(24,110)	1.46	.10

*p < .05.

The univariate ANCOVAs, while controlling for the other demographic variables, indicated that a significant relationship existed between PADC subscale 2 (active involvement in treatment) and chronic hemodialysis patients' ages. The F-value was 25.24. For 1 and 45 degrees of freedom this F-values' p-value was 0.0001, which is less than the .05 level of significance required for this study. The partial correlation coefficient between PADC subscale 2 (active involvement in treatment) and age was -0.60. The above findings indicate that a significant moderately strong negative relationship existed between PADC subscale 2 and chronic hemodialysis patients' ages.

This finding indicates that as chronic hemodialysis patients' PADC subscale 2 (active involvement in treatment) scores increased the age of the patients studied herein decreased and as chronic hemodialysis patients' PADC subscale 2 scores decreased the age of these patients increased. This result

suggests that younger chronic hemodialysis patients in this study displayed more active involvement in their treatment than did the older chronic hemodialysis patients.

In addition, the univariate ANCOVAs while controlling for the other demographic variables indicated that a significant relationship existed between PADC subscale 6 (compliance with dietary restrictions) and chronic hemodialysis patients' ages. The F-value was 4.05. For 1 and 45 degrees of freedom this F-values' p-value was 0.05, which is equal to the .05 level of significance required for this study. The partial regression correlation coefficient between PADC subscale 6 (compliance with dietary restrictiors) and chronic hemodialysis patients' age was a +0.29.

The above indicates that a positive significant relationship existed between PADC subscale 6 (compliance with dietary restrictions) and chronic hemodialysis patients' ages. As the chronic hemodialysis patients' PADC subscale 6 scores increased their ages increased and as chronic hemodialysis patients' PADC subscale 6 scores decreased their ages decreased. This result implies that older chronic hemodialysis patients in this study displayed more dietary compliance behaviors than younger chronic hemodialysis patients.

These results for PADC subscales 2 and 6 in relation to age show that the younger chronic hemodialysis patients in this study displayed more active involvement in their treatment and less

dietary compliance behaviors than did the older chronic hemodialysis patients and show that the older chronic hemodialysis patients displayed less active involvement in their treatment and more compliance with dietary restrictions than younger chronic hemodialysis patients.

The univariate analyses of covariance results indicate that chronic hemodialysis patients' PADC subscales 1, 2, 3, 5, and 7 scores were significantly related to their years of education at the .05 level of significance (Table 4.8).

Table 4.8

Univariate Analysis of Covariance
by PADC Subscales for Years of Education

Subscale	df	F-value	p-value
1. (Emotional Control)	(1,45)	9.01	.004*
2. (Active involvement in treatment)	(1,45)	5.81	.021*
3. (Compliance to medical regimen)	(1,45)	5.55	.023*
4. (Positive Interpersonal behavior)	(1,45)	1.28	.263
5. (Independence)	(1,45)	12.13	.001*
6. (Compliance with dietary restrictions)	(1,45)	.08	.777
7. (Understanding of medical regimen)	(1,45)	6.96	.011*
8. (Acciptance of treatment restrictions)	(1,45)	.03	.856

*p .05

The partial regression correlation coefficients between chronic hemodialysis patients' PADC subscales 1, 2, 3, 5, and 7 scores and their years of education were all positive (Table 4.9).

Table 4.9

Partial Regression Correlation Coefficients between PADC Subscales and Years of Education

Subscales	Partial Correlation Coefficients
1. (Emotional control)	0.40
2. (Active involvement in treatment)	0.34
3. (Compliance to medical regimen)	0.33
5. (Independence)	0.46
7. (Understanding of medical regimen)	0.37

These results indicate that a significant positive relationship existed between chronic hemodialysis patients' PADC subscales 1, 2, 3, 5, and 7 scores and their years of education. These results show that as chronic hemodialysis patients' scores on PADC subscale 1, 2, 3, 5, and 7 increased their years of education increased. Conversely, as chronic hemodialysis patients' scores on PADC subscale 1, 2, 3, 5, and 7 decreased their years of education also decreased.

These results suggest that the more educated chronic hemodialysis patients in this study were more likely to display emotional control, active involvement in their treatment, compliance to their medical regimen, independence, and an understanding of their medical regimen than less educated patients. These results also show that less educated chronic hemodialysis patients are less likely to display emotional control, active involvement in treatment, compliance to their medical regimen, independence, and understanding of their medical regimen than more educated patients. Thus, null hypothesis five was not rejected.

Discussion

The main finding in the present study indicates that chronic hemodialysis patients' levels of compliance to dietary fluid restrictions were associated with some of the displayed psychosocial adjustment attitudes and behaviors as assessed by the PADC. These findings provide some support to the previous findings in the literature which suggest that a positive relationship exists between compliance behaviors of chronic hemodialysis patients and their psychosocial adjustment attitudes and behaviors (Cumming, et al. 1982; Tucker, et al., 1986).

The results of this study show that chronic hemodialysis patients with increasing levels of compliance to dietary fluid restrictions were accurately assessed as displaying increasing compliance with dietary restrictions and show that chronic hemodialysis patients with decreasing levels of compliance to dietary fluid restrictions were accurately assessed as displaying decreasing compliance with dietary restrictions. These findings are contrary to previous findings in the literature that have overwhelmingly demonstrated that direct care personnel estimates of compliance behaviors are no better or only slightly better than a 50/50 chance (Davis, 1968, Mushlin & Appel, 1977).

One possible explanation of the nurses' reliable assessments of their patients' compliance is that hemodialysis nurses in this study were directly responsible for pre- and post- dialysis weighing and for calculations of between dialysis weight

gains of these patients at least three times a week. Therefore, their direct knowledge of these patients' compliance with dietary restrictions may have enhanced their ability to make accurate indirect assessments of these patients' levels of compliance with dietary fluid restrictions.

Even though an overall significant association was found in the present study between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and some of the displayed psychosocial adjustment attitudes and behaviors assessed by the PADC; it should be noted that only one of the eight PADC subscales was found to be significantly related to levels of compliance to dietary fluid restrictions. Furthermore, the one PADC subscale (compliance with dietary restrictions) that was identified as significantly related to chronic hemodialysis patients' levels of compliance to dietary fluid restrictions is actually an indirect measure of patients dietary compliance behaviors.

The lack of a significant positive relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and any of the remaining seven psychosocial adjustment PADC subscales was an interesting finding. These results raise questions as to whether or not an empirically based relationship actually exists between chronic hemodialysis patients levels of compliance to dietary fluid restrictions and specific psychosocial adjustment attitudes and behaviors of hemodialysis patients. Thus hemodialysis health practitioners should not

assume that because a patient is compliant with his or her dietary fluid restrictions that they are also psychosocially adjusted to hemodialysis. These patients may still need to be targeted for assessment, monitoring, and/or interventions to facilitate psychosocial adjustment to the hemodialysis treatment regimen.

In this study chronic hemodialysis patients' levels of compliance to dietary fluid restrictions overall were associated with some of their demographic variables. These findings are not surprising in view of the previous mixed findings in the hemodialysis compliance literature. These findings provide support to some previous studies that have reported a significant relationship between hemodialysis treatment compliance and demographic variables (Adler, 1975; DeNour & Czackes, 1976; Towne & Alexander, 1980). These findings also contradict some previous studies that have reported no significant relationship between hemodialysis patients' levels of compliance and demographic variables.

The finding in this study that as chronic hemodialysis patients' ages increased, their levels of compliance to dietary fluid restrictions also increased suggests that the older chronic hemodialysis patients (55-86) were more compliant to dietary fluid restrictions than younger patients (18-54). This finding provides support to a previous study in the hemodialysis treatment compliance literature that reported a significant positive relationship between chronic hemodialysis patients' levels of

compliance to dietary fluid restrictions and their ages (DeNour & Czackes, 1976).

An explanation for this finding may be that older chronic hemodialysis patients were more stable in their lifestyle routine behaviors than the younger patients and thus tended to adopt compliance with dietary restrictions as another routine behavior. However, it may be that younger chronic hemodialysis patients had not yet developed or adopted stable lifestyle routine behaviors and thus tended to resist complying with dietary restrictions because they view them as reducing their lifestyle freedom.

Chronic hemodialysis patients' length of time on dialysis was not significantly related to their levels of compliance to dietary fluid restrictions. This was surprising in view of the previous findings in the literature reviewed by Haynes et al. (1979) that showed an unequivocal negative relationship between patients' compliance levels and length of treatment. The present findings suggest that compliance is a difficult process that does not occur simply with time and experience as a hemodialysis patient. Thus a need for interventions structed to facilitate compliance seem indicated.

Even though an overall significant association was not found between chronic hemodialysis patients' length of time on hemodialysis and their displayed psychosocial adjustment attitudes and behaviors, it is important to note the univariate finding suggesting that as chronic hemodialysis patients' length of time on hemodialysis increased, their display of positive interpersonal

behaviors decreased. According to hemodialysis patients and nurses positive interpersonal behaviors are important for patients' psychosocial adjustment to hemodialysis (Tucker et al., 1986). Furthermore, hemodialysis patients who display decreased positive interpersonal behaviors over time may compromise the quality of care they receive by possibly precipitating hostile responses from the nurses whom they are dependent upon for treatment and care (Tucker et al., 1981).

Chronic hemodialysis patients' ages and years of education were significantly related to specific psychosocial adjustment PADC subscales. The data suggests that younger patients (18-54) displayed more active involvement in their treatment than older patients (55-86). The more active involvement of the younger patients may be the consequence of their eligibility for a less dependent type of treatment regimen such as continuous ambulatory periotoneal dialysis or kidney transplants, whereas older patients faced a lower probability of such alternative treatments. Therefore, in order to increase their chances to be selected for one of the above or less dependent types of treatment, they were actively involved in their hemodialysis treatment.

The finding that older chronic hemodialysis patients in this study displayed more dietary compliance behaviors than younger patients may be due to the fact that generally hemodialysis and compliance with restrictions are the only realistic life sustaining treatment options for older patients. Younger patients, however,

may not consider compliance with dietary restrictions as essential for lifetime survival, since other treatment options may be available to them (e.g., kidney transplants). In addition older chronic hemodialysis patients generally have had more experience coping with lifestyle restrictions (e.g., physical disabilities) than younger patients. Therefore, older patients may be better equipped to psychosocially adjust to dietary restrictions and consequently manifest more compliant behaviors than younger patients.

The results of this study show that the more years of education chronic hemodialysis patients had acquired prior to hemodialysis treatment, the more likely they were to display emotional control, active involvement in treatment, compliance to their medical regimen, independence, and understanding of their medical regimen. These findings may be due to the fact that more educated individuals were generally more academically prepared to learn the tremendous amount of complex medical and dietary regimen knowledge that is required for hemodialysis patients. The amount of intellectual and emotional difficulties that chronic hemodialysis patients may experience from having to learn this complex medical knowledge may be reduced for more educated patients.

Limitations of the Study

One limitation of this study concerns the validity of the ratings by the volunteer staff nurses. The nurses' workload in the

hemodialysis unit used in this study was typically stressful, thus the overworked conditions of nurses may have affected their degree of carefulness or quality of thinking about patients while making their assessments. In addition, since hemodialysis nurses articulated the items used on the PADC, this researcher did not operationalize the items. Therefore, nurses in this study used their subjective interpretations to determine the meaning of an item which may have had some effect on the assessments. Thus, the data collected may be biased as a result of the validity of the ratings.

Another limitation of this study was that all of the subjects were from one dialysis unit and therefore may not have been representative of patients in other dialysis clinics. This nonrepresentativeness of subjects may limit the generalization of the results of the study. A third limitation involves the use of correlation-type analyses to determine relationships between variables in the study. No cause and effect can be determined regarding the relationships found between variables. Finally, the large number of factors and relatively small sample size for this study may have reduced the inferential statistical power for the analyses used.

CHAPTER FIVE

CONCLUSIONS, IMPLICATIONS, SUMMARY, AND RECOMMENDATIONS

Conclusions

The following conclusions were drawn based on the results of this study:

1. Chronic hemodialysis patients' levels of compliance to dietary fluid restrictions were associated with their displayed compliance with dietary restrictions as assessed by the PADC.
2. Older chronic hemodialysis patients were more compliant with dietary fluid restrictions than younger patients.
3. Chronic hemodialysis patients' levels of compliance to dietary fluid restrictions were not significantly related to their length of time on hemodialysis.
4. Chronic hemodialysis patients' length of time on hemodialysis was not overall significantly related to their displayed psychosocial adjustment factors as assessed by the PADC.
5. Chronic hemodialysis patients' length of time on hemodialysis may be negatively associated with their displayed positive interpersonal behavior as assessed by the PADC.

6. Younger chronic hemodialysis patients displayed more active involvement in treatment and less dietary compliance behaviors than older patients as assessed by the PADC.
7. Chronic hemodialysis patients displayed more emotional control, active involvement in treatment, compliance to medical regimen as assessed by the PADC as their pre-treatment years of education increased.

Implications

One implication of this study for health practitioners is that they should not assume that because patients are compliant with their dietary fluid restrictions that they are also psychosocially adjusted to hemodialysis. These patients may still need to be targeted for assessment, monitoring, and/or interventions to facilitate their psychosocial adjustment to the hemodialysis regimen. Another implication of this study for health practitioners is that hemodialysis nurses are reliable assessors of non-medical aspects of patients functioning important in psychosocial adjustment to hemodialysis. In addition, nurses can indirectly assess patients' levels of compliance to dietary fluid restrictions accurately.

The use of hemodialysis nurses in assessing patients can help to identify chronic hemodialysis patients that require direct monitoring. These health practitioners also can develop individualized treatment plans that may increase or enhance these

patients' psychosocial adjustment to hemodialysis and their levels of compliance to dietary fluid restrictions.

A third implication of this study is that chronic hemodialysis health practitioners may be able to use these results to develop profiles of patients based upon their ages. These patients' profiles can be used by chronic hemodialysis health practitioners to identify specific patients who could benefit from early intervention and treatment programs designed to increase or enhance their levels of compliance to dietary fluid restrictions.

A fourth implication of this study is that chronic hemodialysis patients that display decreased positive interpersonal behaviors over time may compromise the quality of care they receive by possibly precipitating hostile responses from the nurses that they are dependent upon for care. This knowledge can be used by health practitioners to develop educational programs to help prepare future, as well as existing chronic hemodialysis health practitioners, to respond with health counseling skills to facilitate patients' psychosocial adjustment rather than respond with hostility.

A fifth implication is that chronic hemodialysis health practitioners may be able to use the results of this study as a basis to develop profiles of patients who may be at a higher risk for psychosocial maladjustment to hemodialysis. The development of chronic hemodialysis patient profiles based on their age and education levels may be useful for identifing and monitoring

specific patients who could benefit from early intervention and treatment programs to facilitate their psychosocial adjustment to hemodialysis.

These treatment programs (e.g., continous patient education) could be designed to help high risk patients make a good adjustment to hemodialysis treatment. These programs also could be used to reduce the ominous psychological complications of psychosocial maladjustment to the hemodialysis regimen. Another potential use for these chronic hemodialysis patients' profiles by hemodialysis health practitioners is to identify well adjusted patients who may be good candidates for less dependent alternative dialysis treatments such as continuous ambulatory peritoneal dialysis or kidney transplants.

Summary

Empirical research in the area of hemodialysis psychosocial adjustment factors related to levels of compliance to hemodialysis dietary regimen is practically nonexistent. Therefore, the main purpose of this study was to investigate the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their hemodialysis psychosocial adjustment attitudes and behaviors as assessed by the Patient Adjustment to Dialysis Checklist.

Specifically, this study investigated (a) the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their attitudes and behaviors

associated with psychosocial adjustment to hemodialysis; (b) the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their demographic variables of age, sex, race, years of education, and marital status; (c) the relationship between chronic hemodialysis patients' levels of compliance to dietary fluid restrictions and their length of time on dialysis; (d) the relationship between chronic hemodialysis patients' psychosocial adjustment attitudes and behaviors assessed and their length of time on dialysis; and (e) the relationship between chronic hemodialysis patients' psychosocial adjustment attitudes and behaviors and their demographic variables of age, sex, race/ethnicity, years of education, and marital status.

The main finding in the present study indicates that chronic hemodialysis patients' levels of compliance to dietary fluid restrictions were associated with some of the displayed psychosocial adjustment attitudes and behaviors as assessed by the PADC. Specifically, the findings in this study indicated that chronic hemodialysis patients' levels of compliance to dietary fluid restrictions were significantly associated negatively with their (a) displayed compliance with dietary restrictions, as assessed by the PADC, and (b) ages. The findings of this study also indicated that chronic hemodialysis patients' levels of compliance to dietary fluid restrictions were not associated with their length of time on hemodialysis.

Another finding in this study indicated that chronic hemodialysis patients' length of time on hemodialysis was not overall significantly related to their displayed psychosocial adjustment factors as assessed by the PADC. Results also indicated that a negative relationship may exist between chronic hemodialysis patients' length of time on hemodialysis and their displayed positive interpersonal behavior as assessed by the PADC.

The findings of this study also indicated that a significant relationship existed between chronic hemodialysis patients' ages and years of education and some of their displayed psychosocial adjustment factors as assessed by the PADC. Age was negatively related to their displayed active involvement in treatment and positively related to their displayed compliance to dietary restrictions. Years of education were positively related to their displayed emotional control, active involvement in treatment, compliance to medical regimen, independence, and understanding of medical regimen.

Recommendations for Further Study

The present study should be replicated using a larger patient sample, a reduced number of individual operationalized hemodialysis psychosocial adjustment attitudes and behaviors on the PADC, and some additional direct and indirect measures of patient compliance behavior. Additional measures of patient compliance should include patients' monthly potassium and BUN blood levels, as well as reported compliance behavior by patients, their family members, nurses, and physicians.

The present study also should be replicated utilizing the "inception cohort" sampling procedure. This procedure consists of including all patients entering treatment in a dialysis unit or several units, as well as compliance measures of dropouts and "survivors" in determining the final compliance measures.

Future research also should focus on how chronic hemodialysis health practitioners, particularly nurses and psychologists, can use these findings for individual and group counseling directed towards increasing compliance. Research should be conducted to examine the impact of individual and group counseling (using the specific psychosocial adjustment attitudes and behaviors as a focus for therapy) on patients' levels of compliance to the hemodialysis regimen. Research should also be conducted to examine the impact of continous patient education programs on less educated chronic hemodialysis patients' psychosocal adjustment to hemodialysis. Investigators should consider chronic hemodialysis patients' ages and years of education as important variables when designing research studies concerned with the psychosocial adjustment of chronic hemodialysis patients.

APPENDIX A

PATIENT ADJUSTMENT TO DIALYSIS CHECKLIST (PADC)

Patient Code # _____

Nurse Code # _____

Assessment #1____ #2____

Check those items generally displayed by the patient:

Emotional Control

____(1) establishes a meaningful daily routine
____(2) involved in outside activities
____(3) continued with age-appropriate tasks
____(4) perceives self as a total person
____(5) mature interpersonal behavior with family
____(6) discusses illness with family
____(7) healthy independence from family
____(8) maintains social life
____(9) no obsessive thoughts about illness
____(10) accepts reality of disease/dialysis
____(11) exercises regularly
____(12) discusses illness with staff

Active Involvement in Treatment

____(13) expresses interest in home dialysis
____(14) does self-care during treatment
____(15) holds own needle sites
____(16) serious thoughts about kidney transplant
____(17) participates in treatment
____(18) not overly anxious about needle sticks
____(19) seeks outside contact with dialysis patients

Compliance to Medical Regimen

____(20) complies with physician's orders
____(21) takes medication as prescribed
____(22) present for all treatments
____(23) does not abuse alcohol or drugs
____(24) demonstrates good hygiene practices
____(25) interest in gaining knowledge of illness

Dialysis Checklist (cont'd.)
Page 2

Positive Interpersonal Behavior

___(26) shows no inappropriate anger towards staff
___(27) no excessive phone calls to unit about health
___(28) cooperates with staff
___(29) does not exaggerate complaints
___(30) does not manipulate staff
___(31) is seldom depressed
___(32) exhibits friendly, pleasant personality

Independence

___(33) mature interpersonal behavior with staff
___(34) shows health independence from staff
___(35) interacts with other patients at center
___(36) questions medical charts and regimen

Compliance with Dietary Restrictions

___(37) complies with fluid intake restrictions
___(38) complies with dietary restrictions

Understanding of Medical Regimen

___(39) understands need for restricted fluids
___(40) understands need for restricted diet

Acceptance of Treatment Restrictions

___(41) not overly anxious about treatment
___(42) no psychological difficulties regarding machine
___(43) arrives on time for all treatments

APPENDIX B

INFORMED CONSENT FORM

The purpose of this study is to assess chronic hemodialysis patients' adjustment attitudes and behaviors, using the Patient Adjustment to Dialysis Checklist (PADC), which may be associated with compliance to a chronic hemodialysis medical regimen.

The procedures for this study do not involve experimental treatment. Nurse participants will be instructed to complete a PADC once on each of approximately 50 patients. Completion of the checklist will require approximately three to four minutes per patient. The names of the participants and the patients they evaluate will not be recorded. Individual responses will not be shown or discussed with patients or other staff members. Information from participants will be kept in a locked file cabinet in the Psychology Department at the University of Florida.

There are no anticipated risks to participants in this study. Names will not be placed on the checklist such that an individual participant and patient will not be identifiable. The potential benefit to participants will be increased involvement in patient care and increased understanding of factors related to patient adjustment to chronic illness and associated with compliance.

If there are any questions regarding this study, the participant may call Dr. Carolyn Tucker (904) 392-1532 or Mr. Jackie Ayers at (904) 392-4326 or 373-9395, or write to him at Box 9, 114 Psychology Building, University of Florida, Gainesville, Florida 32611. Dr. Tucker or Mr. Ayers will respond by phone or letter as specified by the participant.

A participant who consents to participating in this study may withdraw his or her consent at any time and discontinue participation in the study at any time without prejudice.

No monetary compensation is being offered for participation in this study.

"I have read and I understand the procedure described in the procedure and I have received a copy of this description."

Signatures: _____
Participant

_____
Witness

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APPENDIX C

DEMOGRAPHIC & INTER-DIALYSIS WEIGHT GAIN DATA FORM

PATIENT CODE NUMBER _____

1. Age _____

2. Sex: F _____ M _____

3. Race/Ethnicity: Black____ White____ Hispanic____ Other____

4. Length of Time on Hemodialysis: _____

5. Years of Education: _____

6. Marital Status: Married with Partner (MP) _____
Single with Partner (SP) _____
No Partner (NP) _____

INTER-DIALYSIS WEIGHT GAIN

WEEK	SESSIONS 1	2	3
1.....	_____	_____	_____
2.....	_____	_____	_____
3.....	_____	_____	_____
4.....	_____	_____	_____
5.....	_____	_____	_____
6.....	_____	_____	_____
7.....	_____	_____	_____
8.....	_____	_____	_____
9.....	_____	_____	_____
10....	_____	_____	_____
11....	_____	_____	_____
12....	_____	_____	_____

OVERALL AVERAGE WEIGHT GAIN = _____ (lbs.)

APPENDIX D

ESTIMATE OF THE AVERAGE RELIABILITY OF THE RATINGS FOR THE 43 PSYCHOSOCIAL ADJUSTMENT ATTITUDES AND BEHAVIORS

ITEM	RELIABILITY	AVERAGE RELIABILITY
1	.30	.83
2	.30	.84
3	.22	.77
4	.19	.73
5	.26	.81
6	.19	.73
7	.18	.72
8	.37	.88
9	.19	.66
10	.22	.77
11	.13	.63
12	.18	.73
13	.003	.03
14	.27	.82
15	.30	.83
16	.56	.94
17	.27	.81
18	.07	.49
19	.12	.63
20	.37	.84
21	.39	.88
22	.40	.89
23	.28	.82
24	.45	.91
25	.35	.87
26	.39	.89
27	.08	.52
28	.47	.91
29	.39	.89
30	.42	.90
31	.29	.83
32	.38	.88
33	.34	.86
34	.19	.74
35	.34	.86
36	.37	.87
37	.40	.89
38	.42	.90
39	.24	.79
40	.23	.79
41	.10	.57
42	.16	.70
43	.44	.90

APPENDIX E

ESTIMATE OF THE RELIABILITY OF THE RATINGS FOR THE 8 PADC SUBSCALES

SUBSCALES	RELIABILITY	AVERAGE RELIABILITY
1	.00	.00
2	.09	.55
3	.21	.76
4	.19	.74
5	.23	.79
6	.11	.59
7	.31	.85
8	.29	.83

APPENDIX F

MEANS AND STANDARD DEVIATIONS OF THE RESEARCH VARIABLES

VARIABLE	MEAN	STD DEV
Subscales:		
1 (Emotional control)	.47	.19
2 (Active involvement in treatment)	.37	.12
3 (Compliance to medical regimen)	.61	.21
4 (Positive interpersonal behavior)	.64	.23
5 (Independence)	.53	.18
6 (Compliance with dietary restrictions)	.48	.31
7 (Understanding of medical regimen)	.78	.19
8 (Acceptance of treatment restrictions)	.62	.18
Weight gain	1.88	.86
Length of time on hemodialysis	37.19	29.27
Age	55.37	13.72
Education	9.54	3.99

n=54

APPENDIX G

NURSES DEMOGRAPHIC DATA QUESTIONNAIRE

Nurse Code # _____

1. Age _____
2. Sex: Male ____ Female _____
3. Race: Black _____ White _____ Hispanic _____

   Other _____(specify)
4. Nursing Degree: BSN _____ LPN _____ RN _____

   Other _____(specify)
5. Number of years in nursing _____
6. Number of years in hemodialysis nursing _____
7. Number of years in DCI _____
8. Average number of hours worked each week _____

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BIOGRAPHICAL SKETCH

Jackie L. Ayers was born in Nashville, Arkansas, on January 19, 1953. He graduated with honors from Richland High School in Essex, Missouri.

He received his B.S. in psychology with minors in biology and chemistry from Southeast Missouri State University in 1975 and in 1976 Jackie received his Master of Arts degree in counseling psychology and guidance from Southeast Missouri State University.

While a graduate student at Southeast Missouri State University, Jackie served as the Graduate Student Representative on the Graduate Council and worked as a Youth Specialist II for the Missouri Division of Youth Services. Three months prior to graduation with his M.A. degree, he was hired as an Assistant Director of Student Financial Affairs at Southeast Missouri State University.

In 1978 he was hired as an Instructor in the Counselor Education Department at Southeast Missouri State University.

He was accepted at the University of Florida in the doctoral program in counseling psychology in June 1978. He was awarded minority graduate students fellowships from June 1978 to August 1979. While enrolled in the doctoral program in counseling psychology, he completed an internship with the Department of Community Health and Family Medicine's Family Practice Residency Training Program and a B.S. in Medicine(August 1982) from the College of Medicine's Physician Assistant Program at the University of Florida.

Upon graduation from the Physician Assistant Program he joined the faculty of the University of Florida Physician Assistant Program where he worked as a staff psychologist, provisional assistant professor, and clinical coordinator while completing his dissertation research.

In August 1985 he joined the staff of the University of Florida Student Mental Health Services as a University Counseling Psychologist.

He is married to Shirley A. Clark Ayers.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Roderick McDavis, Chairman
Professor of Counselor Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Carolyn M. Tucker, Co-chairman
Associate Professor of Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Paul J. Wittmer
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This dissertation was submitted to the Graduate Faculty of the College of Education and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

May, 1986

Dean, College of Education

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